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ASSESSMENT OF PHOSPHORUS AND NITROGEN SOURCES IN THE CLARK FORK RIVER BASIN

1988-1991

FINAL REPORT

SECTION 525 OF THE
1987 CLEAN WATER ACT AMENDMENTS

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SUMMARY

From 1988 to 1991, the Montana Department of Health and Environmental Sciences conducted an intensive monitoring program to identify and rank the major point and nonpoint sources of phosphorus and nitrogen that were responsible for nutrient-caused use impairment in the Clark Fork River. The monitoring network included 19 stations on the Clark Fork River, 34 stations on tributary streams and 10 municipal or industrial wastewater discharges. Samples were collected from 14 to 45 times at each location and analyzed for total and soluble forms of phosphorus and nitrogen. Nutrient concentrations were compared to criteria for the control of nuisance algae. Nutrient loads were used to evaluate the relative importance of each tributary and effluent source.

The Clark Fork and many of the wastewater discharges showed progressive declines in nutrient concentrations over the three years. Causes were higher streamflows and reductions in wastewater nutrient loading resulting from phosphorus detergent bans and nutrient control measures at the Stone Container Corporation kraft mill. There was evidence that phosphorus detergent bans had broader than expected effects, possibly by decreasing the availability of high phosphorus detergents in communities without bans. Despite the marked improvements, two reaches of the Clark Fork, Silver Bow Creek, and nearly half the other tributaries continued to show nutrient concentrations in excess of recommended levels.

The Missoula, Deer Lodge, and Butte wastewater treatment plant discharges were the sources most responsible for high nutrient concentrations in the Clark Fork River. Inflows from tributaries with low nutrient concentrations were important in diluting nutrient concentrations in the river.

When averaged over the year, soluble phosphorus loading from tributaries was about equal to that contributed by effluents. About three-fourths of the soluble nitrogen loading came from tributaries. During the summer low streamflow period when nutrient-related use impairment was most prevalent, wastewaters contributed the majority of the nutrient loading to the river.

Tributary sources of soluble nutrient loading were dominated by the Flathead, Bitterroot and Blackfoot rivers. Mission and Crow creeks, Coleman Coulee, and the Little Bitterroot River contributed a large share of the soluble nutrient loading in the lower Flathead River. Discharges of contaminated groundwater from the Missoula area were responsible for a significant portion of the soluble nitrogen loading in the lower Bitterroot River, especially during base flow periods. Flint, Rock and Gold creek, and the Little Blackfoot and Thompson rivers were important sources of soluble phosphorus. The Bull River and Fish Creek were significant sources

of soluble nitrogen.

The Missoula, Butte, and Deer Lodge municipal wastewater discharges and the Stone Container Corporation kraft mill were responsible for most of the soluble nutrient loading from effluents.

These findings established direction for the development of a basin-wide nutrient management plan.

1.0 INTRODUCTION

The Section 525 amendments to the 1987 federal Clean Water Act authorized a three-year comprehensive assessment of water quality in the Clark Fork/Pend Oreille Basin. Under the guidance of EPA Regions VIII and X, the states of Montana, Idaho and Washington were each directed to conduct water quality evaluations in portions of the basin within their states. An interstate steering committee was established to coordinate the project. Funding was appropriated with assistance from the Clark Fork Coalition and the project was formally initiated in July 1988.

Prompted by a growing concern over nutrient (phosphorus and nitrogen) pollution in the basin and limitations in the available data, Montana developed a plan to identify, monitor and rank the major point and nonpoint sources of nutrients to the Clark Fork River in Montana. The Montana portion of the Clark Fork/Pend Oreille basin encompasses approximately 22,000 square miles, or about 85 percent of the total watershed. Consequently, activities which influence the water quality of the river in Montana have a major effect on the Idaho and Washington portions of the drainage.

The upper and middle reaches of the Clark Fork are some of the most productive stream waters in Montana west of the Continental Divide from the standpoint of nutrient concentrations and the potential to grow algae (Bahls et al., 1979a, 1979b). Elevated concentrations of phosphorus and nitrogen promote the growth of nuisance levels of attached algae which adversely affects the use of well over 100 miles of the river (MDHES, 1990). Dense mats of filamentous algae in the Clark Fork above Missoula and heavy growths of diatom algae below Missoula reduce dissolved oxygen levels below state water quality standards and impede irrigation and recreation (MDHES, 1988a; Johnson and Schmidt, 1988; Ingman and Kerr, 1989a). Seasonally, as the algae senesce and decay, water clarity and visual appeal of the river is reduced. The decaying organic matter has also been implicated in the production of river foam which is an aesthetic nuisance of considerable magnitude.

In the lower Clark Fork, concerns have focused on nutrient loading to Idaho's Lake Pend Oreille, which has experienced increased weed and algal growth in recent years (Watson, 1985; MDHES, 1985; Johnson and Schmidt, 1988; IDOHW, 1989; Frenzel, 1991). The Clark Fork supplies the lake with 90 percent of its water and nearly 75 percent of its incoming nutrients.

When the river leaves Lake Pend Oreille it is called the Pend Oreille River. In the state of Washington, the river is plagued with dense growths of rooted aquatic plants. Washington's interest has been in determining factors which promote the growth of the vegetation and developing weed control measures (Pelletier and Coots, 1990; Coots and Carey, 1991).

The Section 525 study emphasizes the nutrient problem in the Clark Fork/Pend Oreille Basic because it is the primary interstate issue. Additionally, it was recognized that the 525 study would provide the resources to assess the nutrient problem on a basin-wide scale.

This final report summarizes the results of Montana's three-year nutrient source assessment project and sets the stage for a forthcoming basin-wide nutrient management plan which will address nutrient and eutrophication problems in the three-state area.

2.0 MONITORING OBJECTIVES

The objectives of Montana's Clark Fork Basin nutrient source assessment were to:

- Document nutrient concentrations and loads in the Clark Fork from its headwaters to Idaho.
- Document nutrient contributions from tributaries and wastewater discharges.
- Identify the most important sources of nutrients.
- Identify controllable sources of nutrients.
- Develop management alternatives which address the nutrient-caused use impairment in the Clark Fork Basin.

3.0 MONITORING APPROACH AND METHODS

Water quality data were collected 15 time annually (monthly from July through March, and twice monthly from April through June) between July 1988 and June 1991. The monitoring network included 19 stations on the Clark Fork River, 34 stations on tributary streams, and ten municipal and industrial wastewater discharges (Table 1 and Figure 1). Some stations were discontinued after the first year of monitoring, while new stations were added in the second and third years. This approach was necessary as preliminary data allowed us to key in on the most important nutrients sources, while at the same time maximizing limited resources. Forty-two of the 63 stations were monitored in all three of the years.

The tributaries monitored accounted for 86 percent of the Clark Fork drainage area upstream from the Idaho border (Figure 2). The remaining 14 percent of the watershed was indirectly monitored through the evaluation of data for mainstem Clark Fork stations. Thus, the vast majority of nonpoint source nutrient loading from tributary watersheds was inventoried. The ten wastewater discharges represented the majority of those in the basin. Four municipal discharges were not monitored (Towns of Philipsburg, Lolo, Stevensville, Hamilton). However, all of the four discharged to either Flint Creek or the Bitterroot River--tributaries that were included in the monitoring network.

Grab-samples for nutrient analysis were collected at each monitoring station during each visit. Subsamples for dissolved nutrients were filtered on site. Samples were stored on ice and delivered to the laboratory for analysis within 48 hours of collection. All sample collection, handling, preservation and storage procedures followed EPA-approved methods (Table 2).

Discharge rates for effluents were measured at the time of sample collection with the primary flow measuring device located at each outfall (weir, flume, or totalizer). Mainstem and tributary streamflows were gaged with standard streamflow gaging equipment at the time of sampling, except for those locations where USGS gaging stations were present.

Nutrient samples were analyzed by the Montana Department of Health Chemistry Laboratory Bureau. Variables analyzed included dissolved orthophosphate (or soluble reactive phosphorus), dissolved nitrate plus nitrite nitrogen, dissolved ammonia nitrogen, total phosphorus, and total Kjeldahl nitrogen. The Stone Container Corporation wastewater proved to be unfilterable and was analyzed for total forms of the above nutrient variables. Analytical methods and detection limits are summarized in Table 2. Extensive field and laboratory quality assurance measures were employed to insure the integrity of the nutrient data. These included 1) acid-washing of all sample collection and filtration equipment, 2) the use of standardized sample collection procedures, 3) analysis of field-originated filter blanks, preservative blanks, trip blanks, and blind duplicate samples, and 4) analysis of lab-originated duplicates, spikes, known standards, and EPA audit samples (Ingman and Kerr, 1989a; MDHES, 1988b; MDHES, 1988c).

Analytical results were used to compute ranges and means for total and soluble phosphorus (P) and nitrogen (N) concentrations. Soluble P was measured as soluble reactive phosphorus (SRP). Soluble inorganic nitrogen (TSIN) was computed by summing dissolved nitrate plus nitrite nitrogen and dissolved ammonia nitrogen concentrations. Total N was computed by summing total Kjeldahl nitrogen and dissolved nitrate plus nitrite nitrogen concentrations. Mean daily nutrient loads were computed for each of the three fiscal years (July through June) and for the summer periods only (July through September).

Tabular and graphic summaries of the data were used to assess: 1) Clark Fork nutrient concentrations and loads throughout the river and over time, 2) problem river reaches from the standpoint of algal growth potential, 3) significant point and nonpoint sources of nutrients, and 4) the relative contribution from each source.

Table 1. Clark Fork Basin Nutrient Monitoring Stations

Station Number/ Abbreviation *		Station Name
I. Mainstem Stations		
07		Clark Fork below Warm Springs Creek
08		Clark Fork near Dempsey
08.5		Clark Fork at Sager Lane Bridge
09		Clark Fork at Deer Lodge
10		Clark Fork above Little Blackfoot River
11		Clark Fork at Gold Creek Bridge
12		Clark Fork at Bonita
13		Clark Fork at Turah
15.5		Clark Fork above Missoula
18		Clark Fork at Shuffield's
20		Clark Fork at Harper Bridge
22		Clark Fork at Huson
23		Clark Fork near Alberton
24		Clark Fork at Superior
25		Clark Fork above Flathead River
27		Clark Fork above Thompson Falls Reservoir
28		Clark Fork below Thompson Falls Dam
29		Clark Fork at Noxon Bridge
30		Clark Fork below Cabinet Gorge Dam
II. Tributaries		
00		Silver Bow Creek above Butte wastewater treatment plant (WWTP)
01		Silver Bow Creek below Colorado Tailings
02		Silver Bow Creek at Miles Crossing near Ramsay
03		Silver Bow Creek above Warm Springs Ponds
04	PD2	Discharge from AMC Pond 2 (Silver Bow Creek)
05	MW	Mill-Willow Bypass at mouth
06	WS	Warm Springs Creek near mouth
07.3	LC	Lost Creek near mouth
08.3	RT	Racetrack Creek near mouth
08.7	DC	Dempsey Creek near mouth
09.3	CW	Cottonwood Creek near mouth
10.2	LB	Little Blackfoot River near mouth
10.5	WC	Warm Springs Creek (near Phosphate) near mouth
10.7	GC	Gold Creek near mouth
11.5	FC	Flint Creek near mouth
12.5	RC	Rock Creek near mouth
14	BL	Blackfoot River near mouth
18.5	BI1	Bitterroot River at HW93 crossing
19	BI2	Bitterroot River near mouth
22.5	9M	Ninemile Creek near mouth
23.7	FI	Fish Creek near mouth
23.9	TC	Trout Creek near mouth
24.7	ST	St. Regis River near mouth

Table 1. Continued

Station Number/ Abbreviation *		Station Name
II. Tributaries (continued)		
26	FH	Flathead River near mouth
26.6	LBI	Little Bitterroot River near mouth
26.7	CR	Crow Creek near mouth
26.8	CC	Coleman Coulee near mouth
26.9	MI	Mission Creek near mouth
27.5	TH	Thompson River near mouth
27.7	PC	Prospect Creek near mouth
28.3	BC	Beaver Creek near mouth
28.5	VR	Vermilion River near mouth
28.6	RK	Rock Creek (near Noxon) near mouth
29.5	BU	Bull River near mouth
III. Wastewater Discharges		
00.5	BUT	Butte Metro WWTP discharge
06.5	WMSP	Warm Springs lagoon discharge
07.7	GAL	Galen WWTP discharge
09.5	DLG	Deer Lodge lagoon discharge
11.6	DRUM	Drummond lagoon discharge
17	MSLA	Missoula WWTP discharge
21	STONE	Stone Container Corporation wastewater discharge
23.5	ALB	Alberton lagoon discharge
24.5	SUP	Superior lagoon discharge
27.6	TFLS	Thompson Falls lagoon discharge

* Station abbreviations are used to identify tributary and point source discharge monitoring stations in the data plots included in this report. Station numbers are used to identify mainstem Clark Fork monitoring stations.

Table 2. Nutrient Sampling and Analysis Methods and Quality Assurance Limits

						Precision		Accuracy	
Variable	Collection	Preservation	Holding Time	Analytical Method*	Detection Limit	Range (µg/l)	Limit (+or-)	Warning Limits (% recovery)	Acceptance Limits (% recovery)
Soluble Reactive Phosphorus	Grab sample, field filtration through 0.45 um membrane filter	Cool, 4° C	48 hours	EPA 365.1	1 µg/l	1- 10 10- 20 20- 100 100- 1000	2 3 4 10	86-109	81-115
Total Phosphorus	Grab sample	H_2SO_4 to pH <2, Cool, 4° C	28 days	EPA 365.1	1 µg/l	1- 20 20- 100 100- 1000	5 11 36	79-121	68-131
Dissolved Nitrate + Nitrite Nitrogen	Grab sample, field filtration through 0.45 um membrane filter	H_2SO_4 to pH <2, Cool, 4° C	28 days	EPA 353.2	10 µg/l	10- 100 100- 500 500- 2000 1000- 4000	10 30 40 80	93-113	88-118
Dissolved Ammonia Nitrogen	Grab sample, field filtration through 0.45 um membrane filter	H_2SO_4 to pH <2, Cool, 4° C	28 days	EPA 350.1	10 µg/l	10- 100 100- 1000	10 20	85-120	77-128
Total Kjeldahl Nitrogen	Grab sample	H_2SO_4 to pH <2, Cool, 4° C	28 days	EPA 351.2	100 µg/l	100- 1500 1500- 5000 5000-10000	200 600 1400	74-128	61-141

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* From U.S. EPA, 1983.

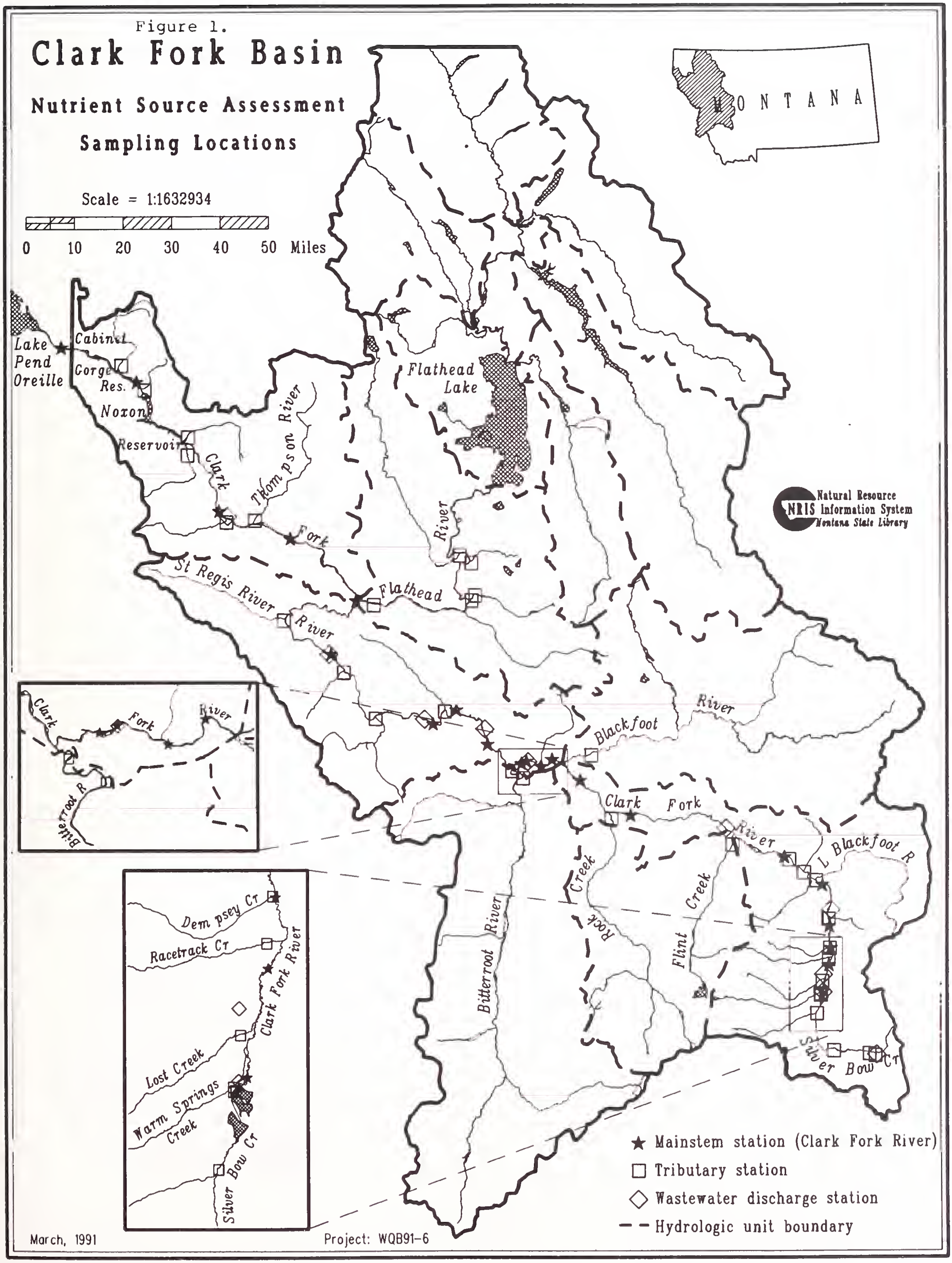

Figure 1.

Clark Fork Basin

Nutrient Source Assessment Sampling Locations

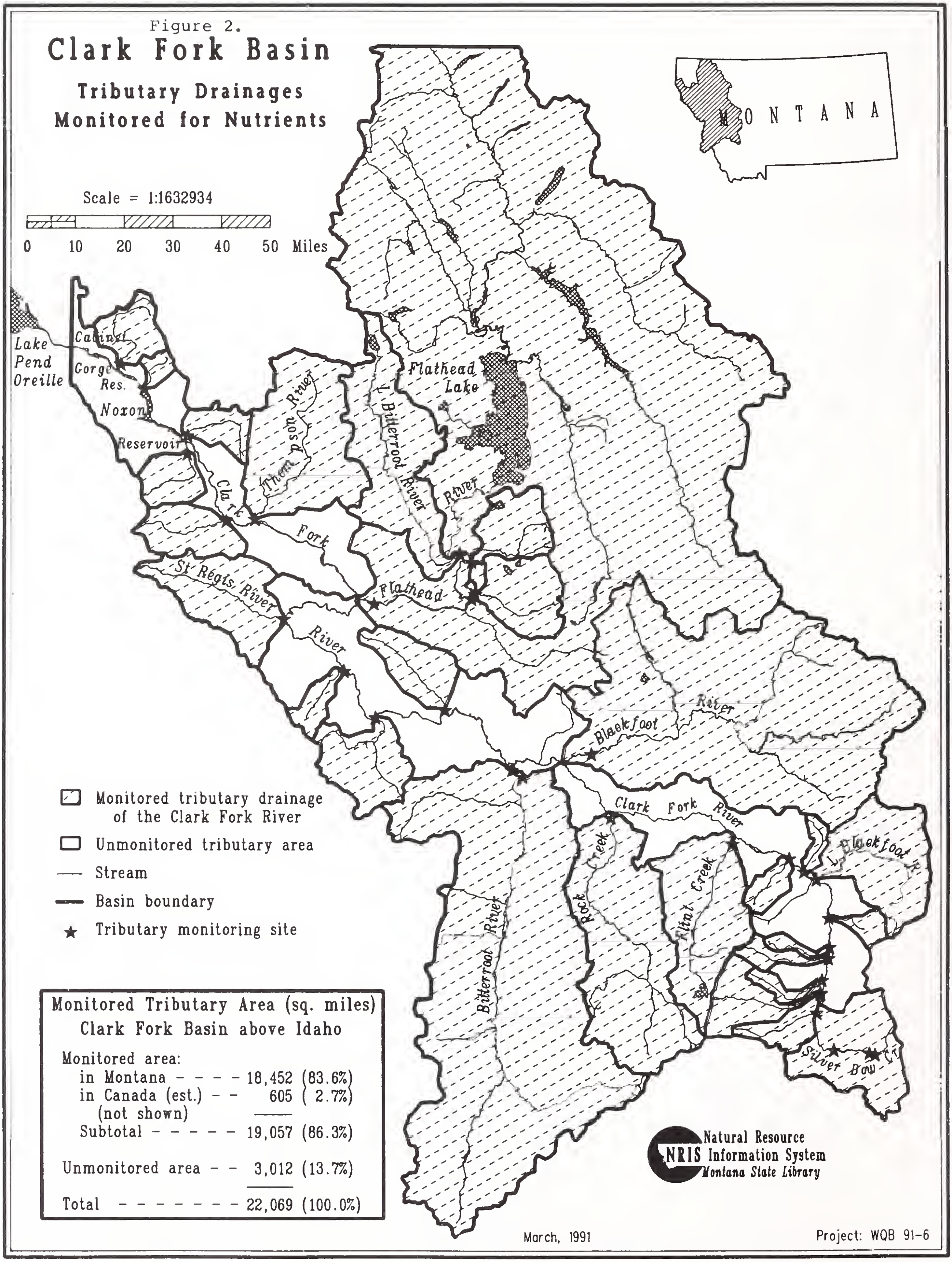

Figure 2.
Clark Fork Basin
Tributary Drainages Monitored for Nutrients

Monitored Tributary Area (sq. miles)
Clark Fork Basin above Idaho

Monitored area:		
in Montana	18,452	(83.6%)
in Canada (est.) (not shown)	605	(2.7%)
Subtotal	19,057	(86.3%)
Unmonitored area	3,012	(13.7%)
Total	22,069	(100.0%)

4.0 RESULTS

4.1 Nutrient Concentrations

Nutrient concentrations were used to evaluate water quality at each mainstem, tributary, and effluent station. Concentrations of nitrogen and phosphorus, especially the soluble inorganic forms, are an important factor controlling the distribution and abundance of attached algae and the degree of algae-related water use impairment in the Clark Fork River Basin (Watson, 1990, 1991). Clark Fork Basin nutrient data summaries are presented in Table 3. Individual data for Fiscal Year 1991 are included in the appendix to this report. Data for the first two years of the project were included in earlier interim reports.

4.1.1 Clark Fork River

Nutrient concentrations in the Clark Fork River were highly variable spatially and temporally, but the pattern was not random. Mean phosphorus concentrations in much of the river showed a progressive decline from one year to the next (Figure 3). Causes for the marked improvement were: 1) The second two years of the study experienced higher streamflows than the first year and greater instream dilution water was available for wastewater discharges, 2) A near-normal spring runoff in the first year of monitoring resulted in a flushing of sediment and organic matter that had accumulated in the river and its tributaries over two previous severe drought years. Instream nutrient concentrations were greatly elevated during this runoff period and increased the first year mean concentrations, 3) Bans on the sale of phosphorus-containing detergents at Missoula, Alberton and Superior, and reductions in wastewater nutrient loading from the Stone Container Corporation kraft mill resulted in major decreases in nutrient loading to the river, and 4) A reduced availability of phosphate detergents elsewhere in the basin, or other unknown factors, caused reductions in wastewater nutrient loading from municipal wastewater treatment facilities at Butte and Deer Lodge, and possibly other cities.

In general, mean nutrient concentrations in the Clark Fork River declined with increasing distance downstream from wastewater discharges (Figures 3 and 4). An initial downstream decline in mean P concentrations in the upper Clark Fork was attributable to increasing distance from the Butte municipal wastewater treatment plant (WWTP) discharge to Silver Bow Creek and increased dilution from incoming tributaries.

Large increases in P concentrations occurred immediately downstream of the Deer Lodge and Missoula municipal WWTP discharges (stations 10 and 18, respectively). Highest mean N concentrations were found in the Deer Lodge area, with increases in concentration apparent from the headwaters area downstream to Deer Lodge, and from above to below the Missoula WWTP discharge. The increasing nitrogen concentrations in the upper Clark Fork were attributable to inflows from contaminated tributaries and possibly irrigation returns and groundwater.

Smaller increases in mean P and N concentrations were observed at station 22, downstream from the Stone Container Corporation kraft mill discharge. Lowest mean P concentrations were found in reaches of the Clark Fork immediately above Deer Lodge and above Missoula (stations 9 and 15.5, respectively) and in the lower Clark Fork from just above the Flathead River confluence to the Idaho border (stations 25-30). Lowest N concentrations were measured above Missoula and below the Flathead River (stations 27-30).

Tributary inflows, most notably from Rock Creek (entering the river between station 12 and 13), and the Little Blackfoot (between stations 10 and 11), Blackfoot (stations 13 to 15.5), Bitterroot (stations 18 to 20), and Flathead rivers (stations 25 to 27), provided increased dilution water and caused notable decreases in mean Clark Fork nutrient concentrations.

The EPA total P criterion of 50 µg/l is a general guideline recommended to control excessive developments of attached algae and to prevent accelerated eutrophication of lakes (U.S. EPA, 1986). This value was commonly exceeded in a short reach of the upper Clark Fork (Station 7) and in the reach from above the Little Blackfoot River confluence to Bonita (stations 10-12), or about 65 miles of the Clark Fork's 350 mile length. This is in sharp contrast to the more than 100 miles of river in which the total P criterion was routinely exceeded during the first year of this study (Figure 3A).

Nutrient criteria for the control of diatom algae in the Clark Fork River have recently been developed (Watson, 1990, 1991). These criteria address saturation concentrations of soluble P and N above which increases in maximum standing crops of diatom algae would not be expected. On the other hand, where instream nutrient concentrations fall short of these criteria, diatom standing crops probably are limited by nutrients. These values are 30 µg/l and 250 µg/l for soluble P and soluble N, respectively. These criteria are not applicable to filamentous algae which are prevalent in the upper Clark Fork, nor do they establish "ideal" concentrations where instream beneficial uses would be protected. We only know that desirable instream nutrient concentration, or target levels, should be somewhere well below these values.

Annual mean soluble nutrient concentrations in the Clark Fork River surpassed the saturation criteria only in limited reaches, especially in the second two years of the three year study (Figures 3B and 4B). For soluble P, these locations were immediately below the Deer Lodge and Missoula WWTP discharges; for soluble N, it was a single location just above Deer Lodge. Much of the Clark Fork showed mean soluble nutrient concentrations that were half, or less, of these criteria. This might suggest that few areas in the river were capable of supporting high levels of diatom algae, due to nutrient limitations.

Algal densities typically reach peak proportions and cause the greatest use impairment during summer. Therefore, it is important to examine soluble nutrient concentration patterns during this period (Figure 5). During July through September, mean soluble P concentrations and the miles of river with criterion exceedences were much greater. Soluble N concentrations, on the other hand, tended to be lower and criterion exceedences were not observed. Several other conclusions can be drawn from the data: 1) The reaches of the river with the highest summer mean P concentrations (Deer Lodge to Bonita and immediately below Missoula) supported the highest densities of algae, and 2) summer concentrations, and the occurrence of criterion excursions, decreased markedly after the first year of study. This suggests that from 1988 to 1991 densities of river algae in the Clark Fork were increasingly limited by ambient nutrient concentrations, especially phosphorus. More importantly, any actions which further reduce summer nutrient concentrations in the Clark Fork realistically can be expected to cause direct reductions in diatom algae standing crops.

4.1.2 Tributaries

Nutrient concentrations in the Clark Fork Basin tributaries also showed a high degree of spatial and temporal variability. Elevated P and/or N concentrations were common in a number of tributaries to the upper Clark Fork and in all of four monitored tributaries to the lower Flathead River (Figures 6 and 7).

In the upper Clark Fork Basin, Silver Bow Creek below the Warm Springs Pond 2 (PD2), Dempsey Creek (DC), Cottonwood Creek (CW), the Little Blackfoot River (LB), Warm Springs Creek near Phosphate (WC), Gold Creek (GC), and Flint Creek (FC) contained elevated soluble P concentrations relative to other tributaries.

P concentrations in Silver Bow Creek below the Warm Springs Ponds, while high, were an order of magnitude less than concentrations found in the creek above the ponds (Stations 01-03 in Table 3). The treatment ponds were constructed to remove metals from mining-related sources in the drainage but they were equally effective at removing nutrients. The source of nutrients in Silver Bow Creek was the Butte WWTP discharge and the problem was inadequate dilution. On average, the Butte WWTP discharge nearly doubled the volume of flow in Silver Bow Creek. Silver Bow Creek does not support nuisance growths of algae because of toxic levels of copper and other metals (Greene, et al., 1986; Ingman and Kerr, 1990).

Gold and Flint creeks drain the geologically P-rich Phosphoria formation and Cabbage Patch Tertiary lake beds. At least a portion of the phosphorus in those drainages came from natural sources (Carey, 1991). Flint Creek also receives a small discharge of treated municipal sewage from the town of Philipsburg and drains a heavily irrigated agricultural subbasin. Little is known about P sources in Dempsey, Cottonwood, and Warm Springs creeks, and the Little Blackfoot River. Land use activities are suspected contributors but natural, geologic sources cannot be ruled out.

Gold Creek and Warm Springs Creek near Phosphate showed highly elevated mean total P concentrations in Fiscal Year 1989. The high levels were the result of major localized flood events on April 6, 1989. Very large sediment loads and total P concentrations approaching 6000 μg/l during one sampling event greatly skewed mean concentrations for the year.

Silver Bow Creek, the Mill-Willow creeks bypass (MW), Lost Creek (LC), Racetrack Creek (RT), and Dempsey Creek (DC) contained very high concentrations of soluble N. Nitrogen in Silver Bow Creek originated from the Butte WWTP discharge. The Mill-Willow Bypass flows adjacent to an unsewered suburb of Anaconda (Opportunity) with a shallow groundwater table. The other streams drain heavily irrigated agricultural and livestock grazing areas and their quality presumably was influenced by nonpoint sources of nutrients associated with those land uses. Inflows from these tributaries were responsible for the increase in N concentrations observed in the upper Clark Fork.

The Bitterroot River (BI1, BI2), Fish Creek (FI), Trout Creek (TC), and the Bull River (BU) exhibited somewhat elevated soluble nitrogen concentrations when compared to adjacent tributaries.

The Bitterroot River receives the Hamilton, Stevensville and Lolo municipal wastewater discharges. The Bitterroot Valley is also extensively subdivided and is a major agricultural and silvicultural area. The two Bitterroot River monitoring stations bracketed an area of known groundwater recharge from the Missoula aquifer (Clark, 1986). The groundwater is nitrogen-rich from septic tank drainage (Ver Hey, 1987) and the inflows tended to increase N concentrations at the lower Bitterroot River station. This was particularly evident during summer and winter low flow periods, when streamflows increased by an average of 15 percent between the two stations. This increase was largely attributable to groundwater recharge from the Missoula area. The rate of groundwater discharge was largest during the summer and this was believed to be influenced by agricultural irrigation in the surrounding area (R. Shields, personal communication).

Fish and Trout creeks drain timbered basins with small human populations, but with extensive logging and roading. Highest N concentrations in these streams occurred during runoff and nonpoint sources are suspected. The quality of water in lower Trout Creek, especially P concentrations, improved markedly during this study when an unauthorized discharge from a lumber mill was terminated.

The Bull River valley is more developed, although its major tributaries drain the Cabinet Mountains Wilderness. A combination of sources, including livestock grazing, subirrigated hay meadows and septic systems, may have contributed to the N in the Bull River, since concentrations tended to be elevated nearly year around.

The Little Bitterroot River (LBI), Crow Creek (CR), and Mission Creek (MI) are tributaries to the lower Flathead River. Each of these streams contained elevated P and N concentrations. Coleman Coulee (CC) is a tributary to Mission Creek and it had the highest P and N concentrations of any tributary examined, except Silver Bow Creek below the Butte sewage outfall. These four tributaries drain areas with highly erodible soils (glacial lakebed sediments) and suffer impacts from irrigation and other agricultural practices.

Rock Creek near Clinton (RC), the Blackfoot River (BF) and many tributaries to the middle and lower Clark Fork had good water quality relative to P and N concentrations.

4.1.3 Wastewater Discharges

All of the monitored wastewater discharges in the Clark Fork Basin contained large concentrations of soluble P and N (Figure 8). The majority of nutrients in effluents are in a soluble form and therefore only soluble concentrations are presented.

The Stone Container Corporation kraft mill discharge (STONE) contained some of the lowest mean concentrations of nutrients relative to the other discharges. Its quality reflected continuing efforts by its managers over the previous seven years to reduce both N and P levels in the wastewater (Stone Container Corp., 1990; Ingman and Kerr, 1989b).

Reductions in P concentrations in the Missoula WWTP discharge (MSLA) resulted from the implementation of a ban on the sale of phosphorus-containing detergents in May 1989. The FY89 mean P concentration reflected two of twelve months with the ban in effect. Longer term monitoring data showed nearly a 50 percent reduction in P concentrations in FY91 when compared to the average for FY85-88. However, part of the decrease may have been due to the termination of a dairy wastewater discharge to the city sewer in the same year the P ban was enacted.

The quality of the Superior wastewater lagoon discharge (SUP) showed marked improvements as a result of a phosphorus detergent ban enacted in FY90. Phosphorus concentrations in FY91 showed about a 40 percent reduction from pre-ban values.

The community of Alberton also adopted a P detergent ban in FY91. Only one year of pre-ban monitoring data was gathered from that municipal wastewater discharge (ALB). However, it can be assumed that its current quality would reflect similar improvements to those seen at Missoula and Superior, if recent monitoring information was available.

The Butte and Deer Lodge municipal wastewater discharges (BUT, DLG) also showed substantial decreases in P concentration over the three year period. However, phosphorus detergent bans were not imposed in those cities. It is strongly suspected that the improved quality of those effluents was an indirect result of P bans at downstream communities. Soap and detergent distributors may have stocked fewer of the high phosphorus products in Butte and Deer Lodge, since they were no longer marketable in other larger communities, such as Missoula. The Clark Fork Coalition will be conducting shelf surveys and contacting distributors to see if this is the case. The Butte Metro WWTP manager was not aware of other factors which could have caused the decline in Butte effluent P concentrations (W. Pasco, personal communication).

Nutrient concentrations in the Warm Springs (WMSP), Galen (GAL), Drummond (DRUM), and Thompson Falls (TFLS) wastewater lagoon discharges were evaluated for one year only because of their small potential for impacting the Clark Fork River. With the exception of Galen, their concentrations were generally lower than the other municipal discharges, but year to year variability remains unknown.

Table 3. Clark Fork Basin Nutrient Concentration Data Summary

					Concentration (μg/l)							
Station	FY Monitored				SRP		Total P		TSIN		Total N	
Number	89	90	91	N=	Conc.Range	Mean	Conc.Range	Mean	Conc.Range	Mean	Conc.Range	Mean
I. Mainstem Stations												
07	89	90	91	45	<1 - 70	19	21 - 117	56	10 - 840	220	230 - 1340	592
08	89	90	91	45	2 - 22	12	16 - 135	44	<10 - 690	214	230 - 1340	578
08.5		90	91	30	1 - 22	8	13 - 97	36	10 - 650	227	250 - 1540	598
09	89	90	91	45	1 - 24	8	12 - 133	43	30 - 850	288	270 - 1390	658
10	89	90	91	44	1 - 92	29	29 - 165	75	<10 - 740	235	200 - 1410	662
11	89	90	91	44	<1 - 84	23	27 - 133	58	<10 - 590	149	200 - 1170	495
12	89	90	91	45	4 - 53	19	18 - 240	55	<10 - 450	89	200 - 1610	469
13	89	90	91	45	3 - 34	11	15 - 167	36	<10 - 340	65	120 - 1020	352
15.5	89	90	91	45	3 - 21	7	8 - 118	26	<10 - 190	38	<100 - 1130	277
18	89	90	91	45	8 - 96	28	26 - 112	49	30 - 280	122	<100 - 950	387
20	89	90	91	45	4 - 27	11	17 - 89	32	20 - 260	88	<100 - 670	312
22	89	90	91	45	4 - 38	13	19 - 108	38	<10 - 290	77	<100 - 700	352
23	89	90	91	45	4 - 30	11	17 - 96	33	<10 - 270	66	<100 - 800	342
24	89	90	91	45	3 - 36	8	11 - 82	27	<10 - 270	56	<100 - 880	268
25	89	90	91	45	2 - 18	6	9 - 74	23	<10 - 240	45	<100 - 870	252
27	89	90	91	45	<1 - 13	2	5 - 59	14	<10 - 110	27	<100 - 650	159
28	89	90	91	45	<1 - 8	2	5 - 49	14	<10 - 160	28	<100 - 740	160
29	89	90	91	45	<1 - 14	3	4 - 45	11	<10 - 180	36	<100 - 640	151
30	89	90	91	45	<1 - 5	2	4 - 31	11	<10 - 150	32	<100 - 740	153
II. Tributaries												
00	89	90	91	45	9 - 98	28	56 - 337	115	540 - 2460	1671	1120 - 4140	2117
01	89	90	91	45	324 -1870	777	546 -2360	1199	1460 - 5670	4092	2190 - 6410	5029
02	89	90	91	45	31 - 654	278	317 -1230	670	1130 - 5390	2870	1860 - 5600	3487
03	89	90	91	45	11 - 284	129	181 - 998	435	1755 - 3230	1853	1110 - 4280	2501
04	89	90	91	45	1 - 137	30	22 - 320	93	<10 - 1260	318	150 - 2140	834
05	89	90	91	43	<1 - 49	9	9 - 116	33	<10 - 820	218	140 - 1060	525
06	89	90	91	45	<1 - 16	5	8 - 36	14	<10 - 330	82	<100 - 1050	303
07.3	89	90	91	45	2 - 17	5	6 - 69	24	<10 - 930	303	220 - 1600	594
08.3	89			15	<1 - 42	8	11 - 66	19	120 - 360	210	140 - 1080	412
08.7	89			15	18 - 36	29	30 - 64	44	180 - 780	460	180 - 1050	649
09.3	89			15	9 - 120	30	19 - 156	49	<10 - 190	32	<100 - 600	261
10.2	89	90	91	45	10 - 93	19	21 - 750	47	<10 - 100	20	<100 - 1370	310
10.5	89			15	5 - 161	21	17 -5940	303	<10 - 220	90	110 - 5920	561
10.7	89	90	91	45	27 - 402	87	53 -4330	171	<10 - 550	57	<100 - 9500	484
11.5	89	90	91	44	11 - 86	37	25 - 343	71	<10 - 350	75	140 - 1600	437
12.5	89	90	91	45	1 - 11	6	9 - 52	16	<10 - 50	12	<100 - 1020	203
14	89	90	91	45	<1 - 16	4	4 - 121	19	<10 - 440	38	<100 - 940	230
18.5	89	90	91	45	<1 - 36	6	10 - 64	21	10 - 220	73	<100 - 870	279
19	89	90	91	45	<1 - 32	6	10 - 60	21	10 - 240	81	<100 - 1260	299
22.5		90	91	30	2 - 6	4	4 - 36	14	<10 - 60	14	<100 - 450	138
23.7		90	91	30	<1 - 14	2	1 - 21	6	<10 - 130	42	<100 - 700	125
23.9			91	15	1 - 23	4	3 - 41	9	<10 - 250	59	<100 - 760	155
24.7		90	91	30	<1 - 5	2	1 - 21	6	<10 - 60	15	<100 - 860	144

Table 3. Continued

Station	FY Monitored				Concentration (µg/l)							
					SRP		Total P		TSIN		Total N	
Number	89	90	91	N=	Conc.Range	Mean	Conc.Range	Mean	Conc.Range	Mean	Conc.Range	Mean
II. Tributaries (continued)												
26	89	90	91	45	<1 - 19	2	4 - 78	10	<10 - 120	24	<100 - 730	123
26.6		90	91	30	36 - 502	104	68 - 688	178	<10 - 1030	68	400 - 3000	841
26.7		90	91	28	5 - 121	30	24 - 140	61	10 - 890	293	240 - 2200	751
26.8			91	15	68 -1010	220	109 -1280	344	<10 - 3920	738	770 - 8870	2270
26.9		90	91	29	2 - 146	27	13 - 274	58	<10 - 1130	224	<100 - 1920	574
27.5	89	90	91	45	<1 - 10	4	5 - 43	14	<10 - 100	15	<100 - 730	133
27.7	89	90	91	45	<1 - 10	4	4 - 30	9	<10 - 60	16	<100 - 920	<100
28.3		90	91	26	2 - 12	6	8 - 26	14	<10 - 50	<10	<100 - 700	<100
28.5		90	91	30	2 - 8	4	6 - 14	8	<10 - 40	<10	<100 - 740	<100
28.6			91	15	<1 - 6	2	2 - 8	5	<10 - 50	20	<100 - 730	<100
29.5		90	91	30	<1 - 7	1	3 - 38	7	<10 - 100	40	<100 - 770	102
III. Wastewater Discharges												
00.5	89	90	91	45	1530 -4520	2600	1710 -5200	2989	4690 -11970	8715	6610 -14360	10509
06.5	89			14	34 - 468	195	93 - 886	376	140 - 2250	987	110 - 4330	2628
07.7	89			15	1290 -4280	2712	1470 -4500	3012	2580 -11500	7414	4080 -13000	9421
09.5	89	90	91	45	729 -2650	1742	806 -5250	2062	1330 - 9150	5353	2570 -14180	8073
11.6	89			15	67 -1110	613	298 -7870	1412	10 - 4420	1837	910 - 4610	3153
17	89	90	91	45	2350 -5300	3480	2370 -6150	3634	6200 -24700	15480	10660 -41620	17573
21*	89	90	91	34	24 - 997	325	104 -1060	585	210 - 2870	1405	2400 - 8300	4735
23.5	89			15	2310 -6210	4420	2730 -6850	5118	5040 -19540	13612	10430 -23820	18046
24.5	89	90	91	45	864 -6880	4411	3160 -9620	5121	7840 -20030	15742	14660 -27640	21480
27.6	89			15	313 -4220	2207	1710 -4650	3140	10 -17560	3737	5410 -10550	7675

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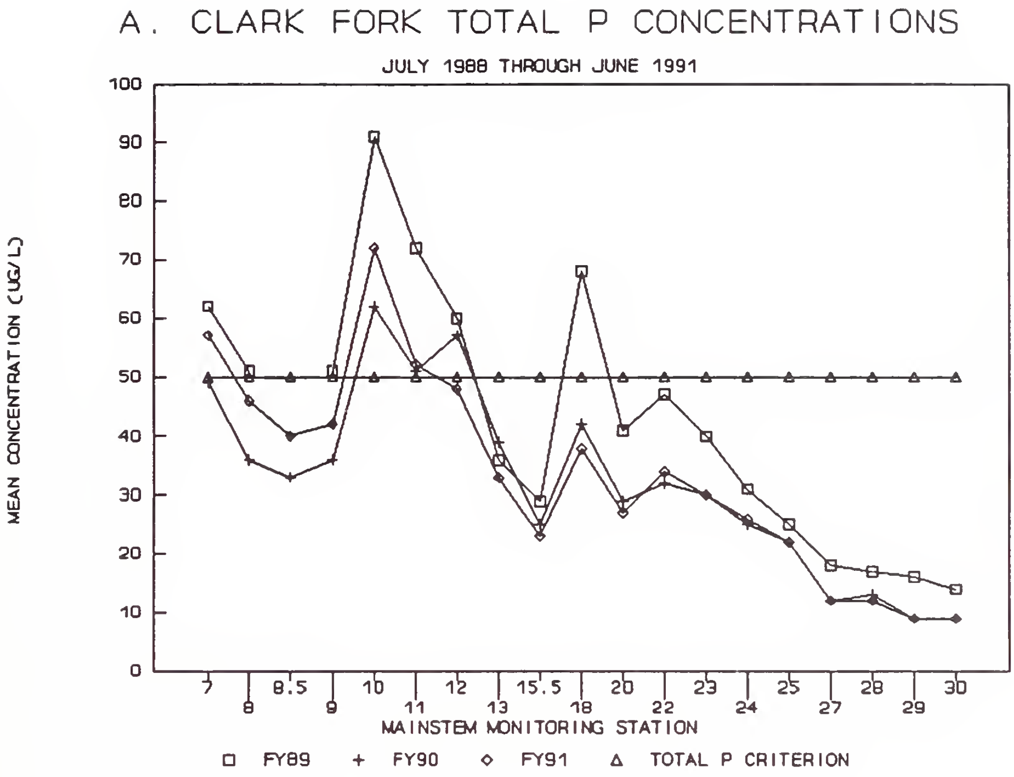
* Concentration data given are all totals. Stone wastewater is not filterable.



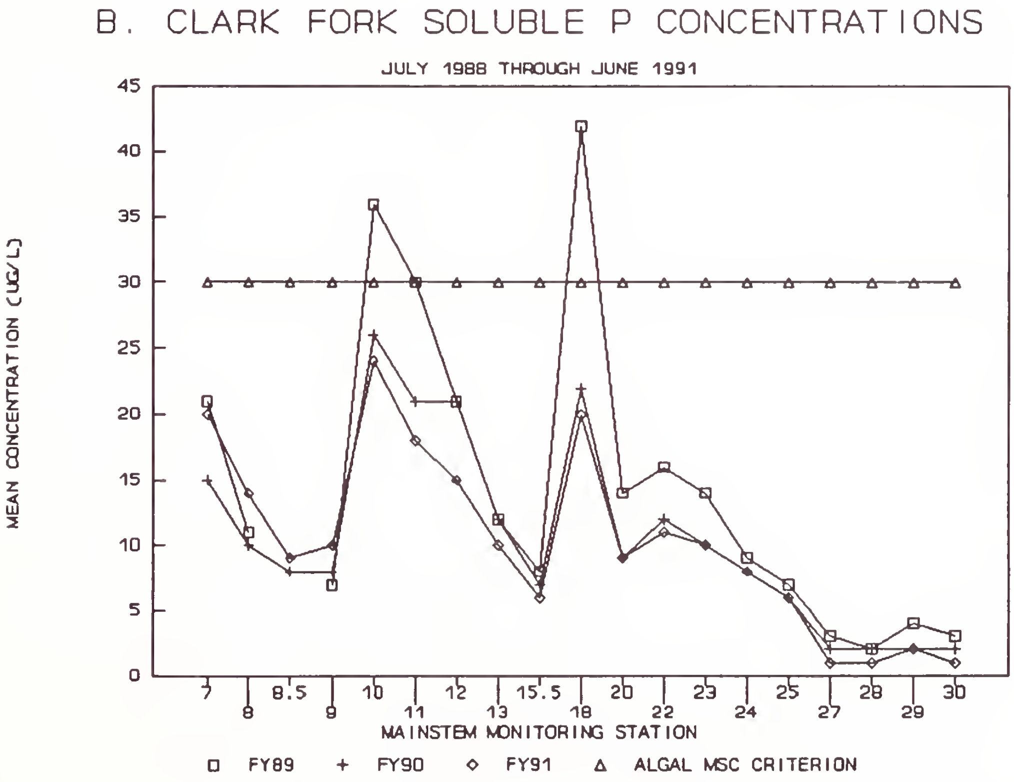
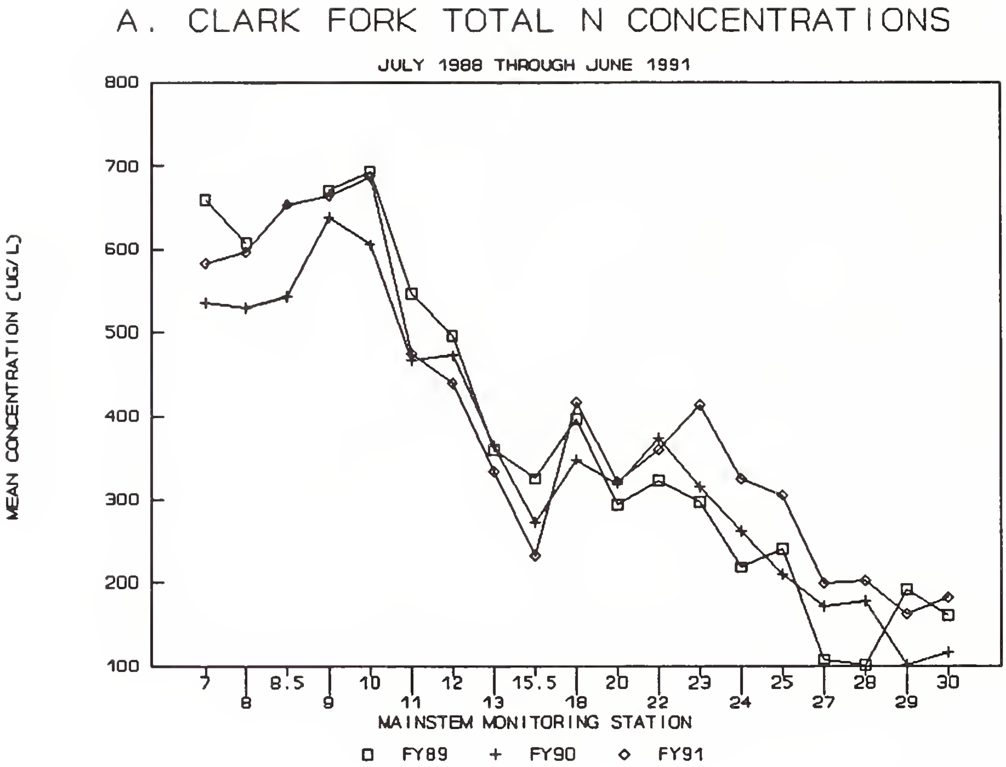


Figure 3. Mean phosphorus concentrations in the Clark Fork River during State Fiscal Years 1989-1991. A - Total P. B - Soluble P. Total P criterion is a general guideline for the prevention of excessive developments of attached algae and to prevent accelerated eutrophication of lakes (U.S. EPA, 1986). Soluble P criterion Is a "saturation" concentration for the Clark Fork below which diatom algae standing crops are limited by phosphorus (Watson, 1991).



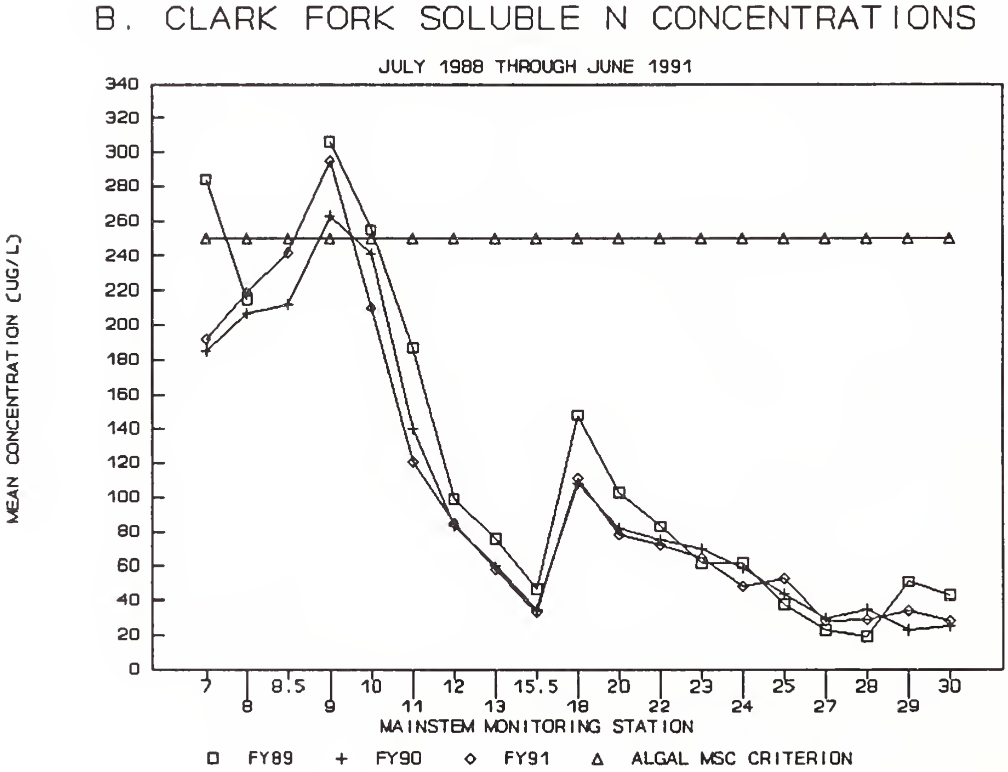


Figure 4. Mean nitrogen concentrations in the Clark Fork River during State Fiscal Years 1989 - 1991. A - Total N. B - Soluble N. Soluble N criterion is a "saturation" concentration for the Clark Fork below which diatom algae standing crops are limited by nitrogen (Watson, 1991).

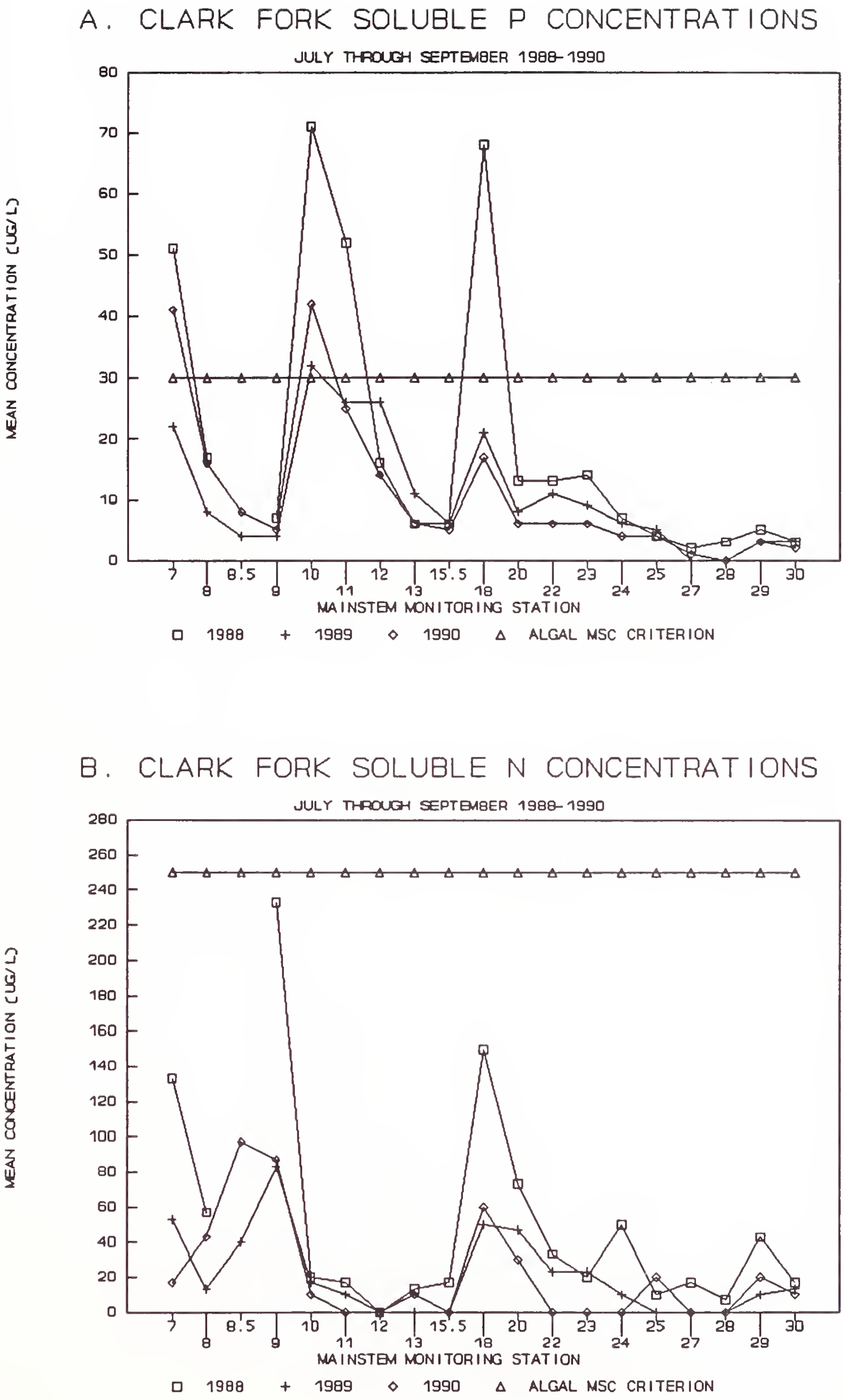
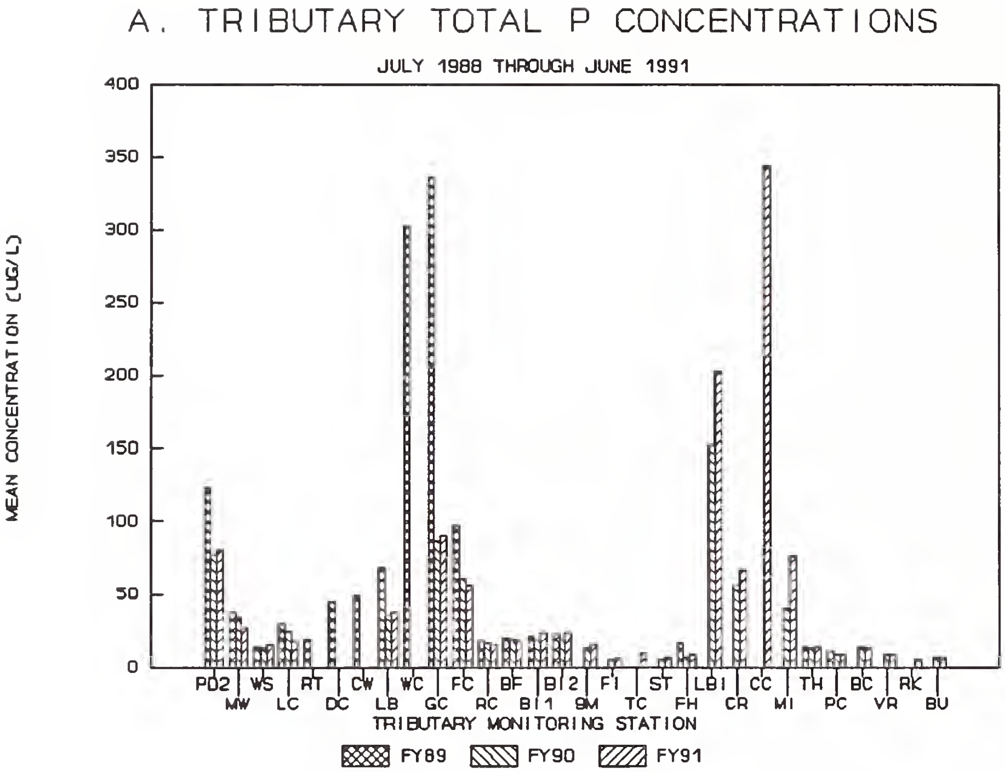


Figure 5. Mean phosphorus and nitrogen concentrations in the Clark Fork River during summer (July through September), 1988 - 1990. A - Soluble P. B - Soluble N. Criteria are saturation concentrations for diatom algae standing crops in the Clark Fork (Watson, 1991).



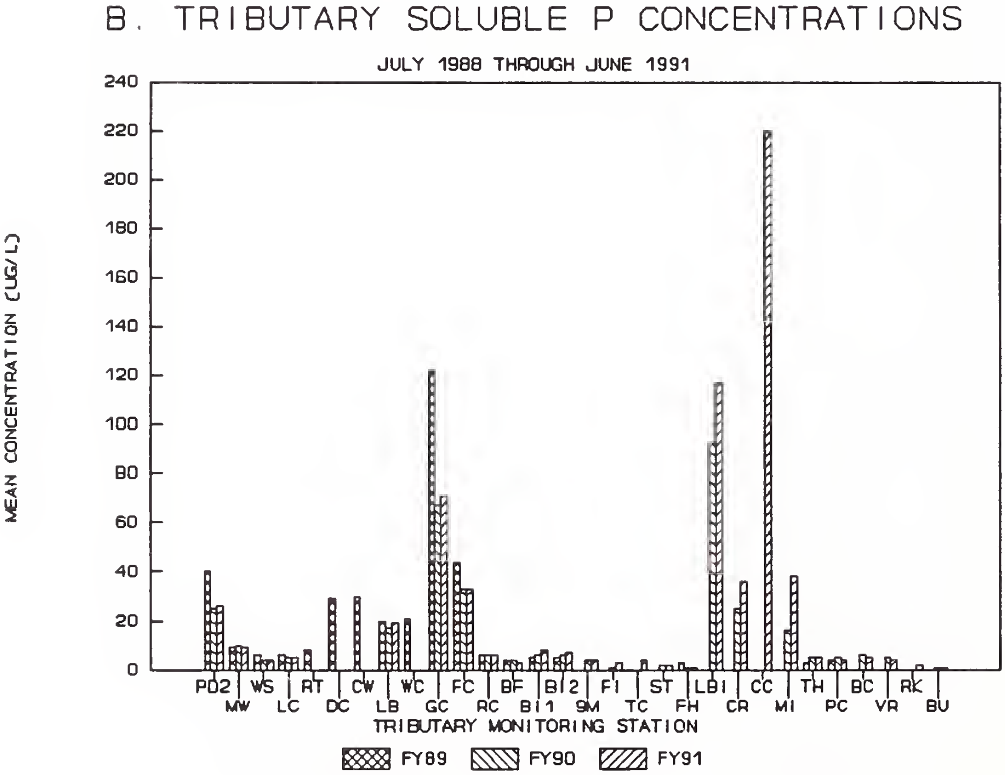
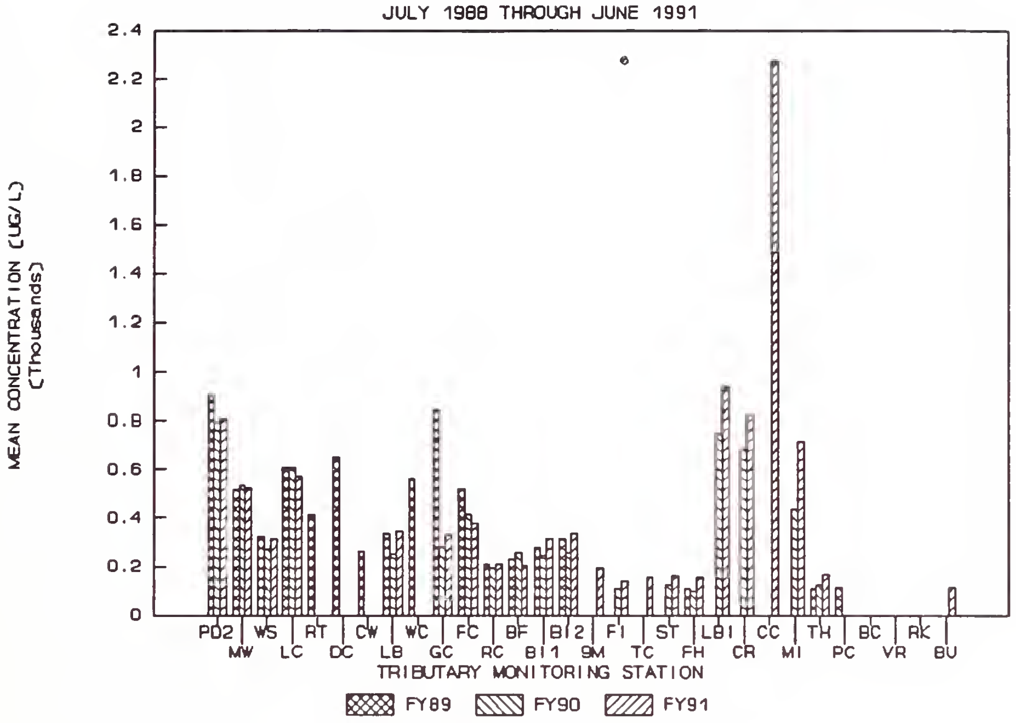


Figure 6. Mean phosphorus concentrations in selected Clark Fork River tributaries during State Fiscal Years 1989-1991. A - Total P. B - Soluble P.

A. TRIBUTARY TOTAL N CONCENTRATIONS



B. TRIBUTARY SOLUBLE N CONCENTRATIONS

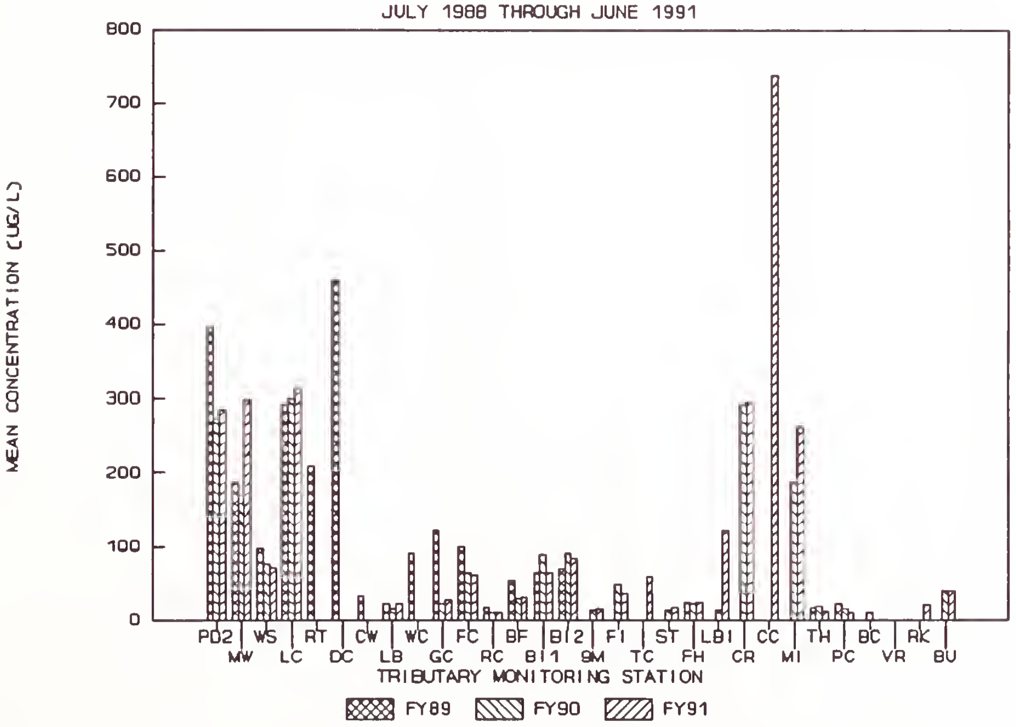
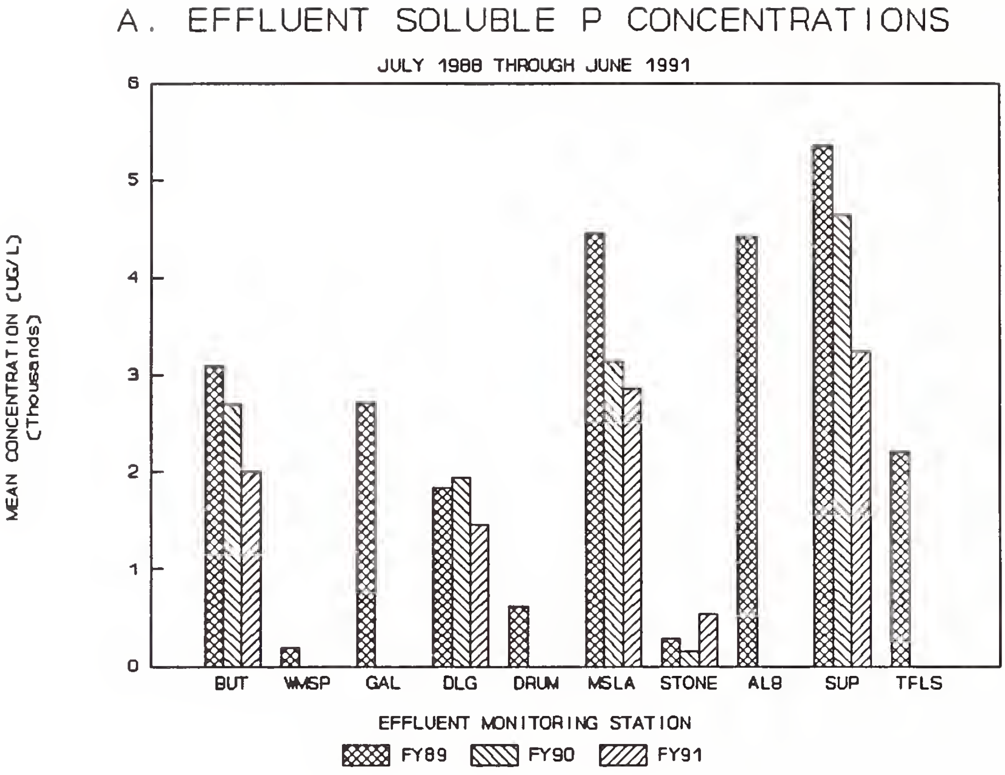


Figure 7. Mean nitrogen concentrations in selected Clark Fork Basin tributaries during State Fiscal Years 1989 - 1991. A - Total N. B - Soluble N.



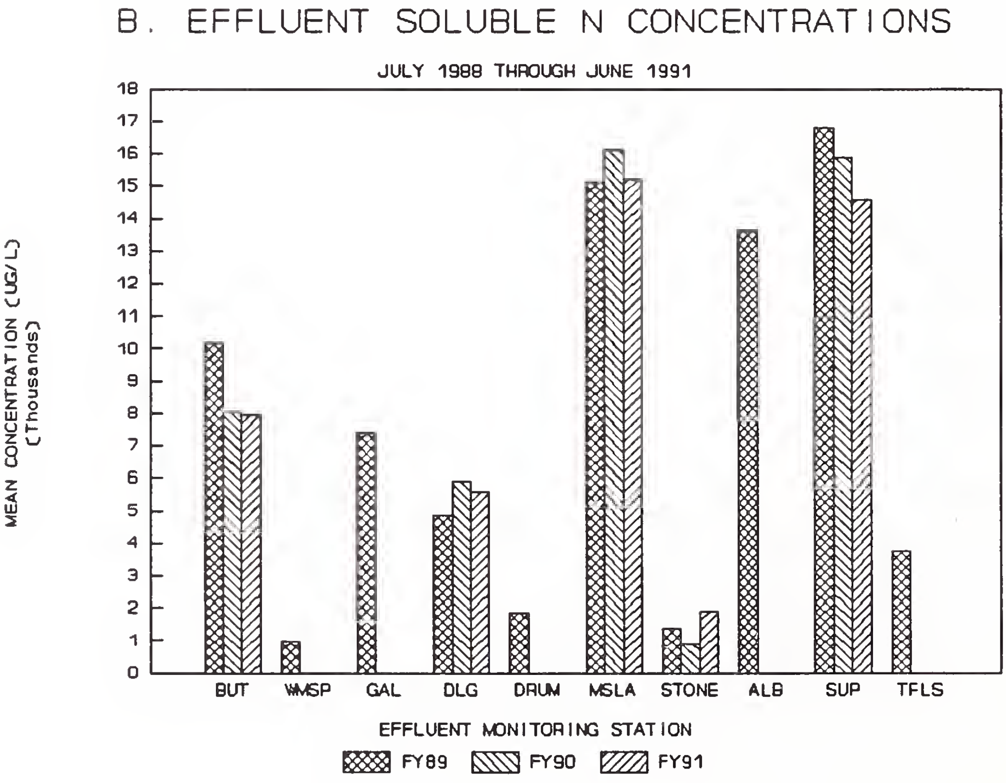


Figure 8. Mean phosphorus and nitrogen concentrations in selected Clark Fork Basin wastewater discharges during State Fiscal Years 1989 - 1991. A - Soluble P. B - Soluble N.

4.2 Nutrient Loads

Nutrient loads provide a measure of the total weights of nitrogen and phosphorus discharged per unit of time. This information allowed us to compare and develop rankings of point and nonpoint sources of nutrients on the basis of quantities of P and N discharged to the river. This information will be especially useful to water quality managers as a plan is developed to control those sources most responsible for elevated river concentrations. Nutrient loading in the Clark Fork River is also a critical factor in determining the trophic status, or state of enrichment, of Lake Pend Oreille. Clark Fork Basin nutrient load data for FY's 1989-1991 are summarized in Table 4.

4.2.1 Clark Fork River

Mean nutrient loads in the Clark Fork River from its headwaters to the Idaho border showed a distinct pattern of influence from population centers and incoming large tributaries (Figures 9 and 10). Nutrient loads in the upper Clark Fork were small when compared to downstream locations, even though upper Clark Fork nutrient concentrations were among the highest in the river. This was due to the relative differences in river volume.

The upper Clark Fork is a small river in contrast to the lower Clark Fork, which contains more than 300 times as much water on the average. As tributaries enter the Clark Fork at various places, they add pounds or tons of nutrients. However, if their nutrient concentrations are lower than the main river, Clark Fork nutrient concentrations will be diluted. Nutrient loads, on the other hand, tend to be additive.

Tributaries such as the Little Blackfoot River (entering the Clark Fork between stations 10 and 11), Flint Creek (between stations 11 and 12), the Blackfoot River (13 and 15.5), the Bitterroot River (18 and 20), and Flathead River (25 and 27) were responsible for substantial increases in Clark Fork nutrient loading, even though their nutrient concentrations were generally less than the Clark Fork.

Population centers and municipal wastewater discharges at Deer Lodge (between stations 9 and 10) and especially Missoula (15.5 and 18) caused large increases in Clark Fork nutrient loads. This was particularly evident for soluble P and N.

Clark Fork nutrient loads from below the Bitterroot River to the Flathead River (stations 20 to 25) stayed relatively constant, or decreased slightly as a function of algal uptake. This reach of river supported heavy growths of diatom algae and decreases in soluble nutrient loads were particularly evident in summer and fall.

Below the Flathead River, Clark Fork nutrient loads did not display a meaningful trend. Load estimates for stations 27-30 had low precision due to very large streamflows and consistently low nutrient concentrations (frequently at or below the limit of analytical detection). However, an observed decrease in total P loading from above to below Noxon Rapids Reservoir (stations 28 and 29) was probably real, due to a settling of particulate matter in the reservoir.

Clark Fork nutrient loads were variable from year to year. Most apparent was a progressive decrease in soluble phosphorus loading at most stations. This was due to the factors discussed earlier which were responsible for the decline in Clark Fork soluble P concentrations. The largest decrease in soluble P loading was observed at station 18, downstream of the Missoula WWTP, following the adoption of the P detergent ban.

An apparent large increase in mean total N loading was observed at lower Clark Fork stations in FY91. Most of this increase resulted from a brief period in late spring when organic N concentrations were elevated and streamflows were at their peak. While the precision of the load estimates for these stations was poor, annual fluctuations of this magnitude would not be unusual in such a large river system.

4.2.2 Tributaries

On a year around basis, tributary nutrient loading to the Clark Fork was dominated by a handful of streams (Figures 11 and 12). The largest tributaries--the Flathead (FH), the Bitterroot (BI1, BI2), and the Blackfoot (BF) rivers--contributed most of the total and soluble nutrient load. Again, nutrient concentrations in these rivers were relatively low but because their volumes were so large, their cumulative loadings were sizeable.

Increases in soluble N loading in the Bitterroot River from above to below Missoula (BI1 to BI2) were detectable on an annual basis, but they were even more pronounced during low streamflow periods.

Mission Creek (MI), its tributary Coleman Coulee (CC), Crow Creek (CR), and the Little Bitterroot River (LBI) were large sources of the soluble nutrient load carried by the Flathead River. Together, these streams discharged more than half as much soluble P and a sixth as much soluble N as the entire Flathead River. Coleman Coulee, with an average flow of about 10 cubic feet per second (CFS), was the smallest of the tributaries in the monitoring network. Despite its size, Coleman Coulee discharged about a quarter as much soluble P as the Flathead River, which had a mean annual flow of more than 11,000 cfs.

Gold Creek (GC), Flint Creek (FC), Rock Creek (RC), the Little

Blackfoot River (LB), and the Thompson River (TH) were significant sources of soluble P loading to the Clark Fork River.

Fish Creek (FI) and the Bull River (BU) discharged notable amounts of soluble N to the middle and lower reaches of the Clark Fork. Nutrient contributions from other Clark Fork Basin tributaries were collectively important, but individually rather insignificant.

With a few exceptions, tributary nutrient loading did not appear to fluctuate by a large margin during the course of the three-year study.

4.2.3 Wastewater Discharges

Nutrient loading from effluents was dominated by the Missoula (MSLA) and Butte (BUT) WWTP discharges. The Deer Lodge (DLG) WWTP and Stone (STONE) kraft mill discharge contributed smaller loads of nutrients (Figure 13). The remaining six municipal discharges, even collectively, were relatively insignificant nutrient sources.

Decreases in phosphorus loading from the Butte, Deer Lodge, Missoula and Superior wastewater treatment facilities were a result of the phosphorus detergent bans, and possibly other factors, discussed earlier.

Overall, soluble phosphorus loading to the Clark Fork from the major municipal wastewater discharges was down by 66 kg/day, or 37 percent, in FY91 compared to FY89. Soluble nitrogen loading from municipal effluents was relatively constant over the period.

Phosphorus and nitrogen loading from the Stone Container Corporation wastewater discharge increased in the third year of the study.~~period.~~ Despite the increase, loading rates remained several times less than in earlier years, before nutrient control measures were adopted. Nutrient loading to the Clark Fork River from groundwater seepage down gradient of Stone's wastewater storage and percolation ponds is not included in these figures. Nutrient loading from pond seepage is considered to be greater than that from Stone's direct discharges. When this is taken into account, Stone's contribution to Clark Fork River nutrient loads becomes more substantial. Stone is currently conducting studies to quantity the amount of nutrient seepage from the mill.

4.2.4 Nutrient Loading during Summer

Soluble nutrient loading to the Clark Fork River during summer was evaluated to determine which sources were likely to be most important in supporting the dense summer growths of attached algae (Figure 14). This loading was clearly dominated by effluents. Overall, effluents contributed about 82 percent of the soluble P and 70 percent of the soluble N loading in FY's 1989-1991, if all of the Butte WWTP loading to Silver Bow Creek is included.

In the upper Clark Fork, where attached algae densities reach peak proportions, wastewater discharges provided about 40 percent of the summer soluble P and N loading. These figures take into account the Warm Springs Ponds effectiveness at reducing nutrient loading from the Butte WWTP, especially in summer. The single largest effluent source of soluble nutrient loading to the upper Clark Fork during summer was the Deer Lodge WWTP.

Wastewater discharges provided 85 and 65 percent of the summer soluble P and N loading, respectively, to the middle Clark Fork River during summer. The Missoula WWTP contributed about 97 percent of that total, despite the phosphorus detergent ban. The summer wastewater discharges from the Stone kraft mill were negligible as a result of discharge permit limitations. However, nutrient loading from groundwater seepage downgradient of the mill may have been significant.

In the lower Clark Fork, where attached algae were not a common problem, most of the soluble nutrient loading in summer was discharged by the Flathead River and its tributaries.

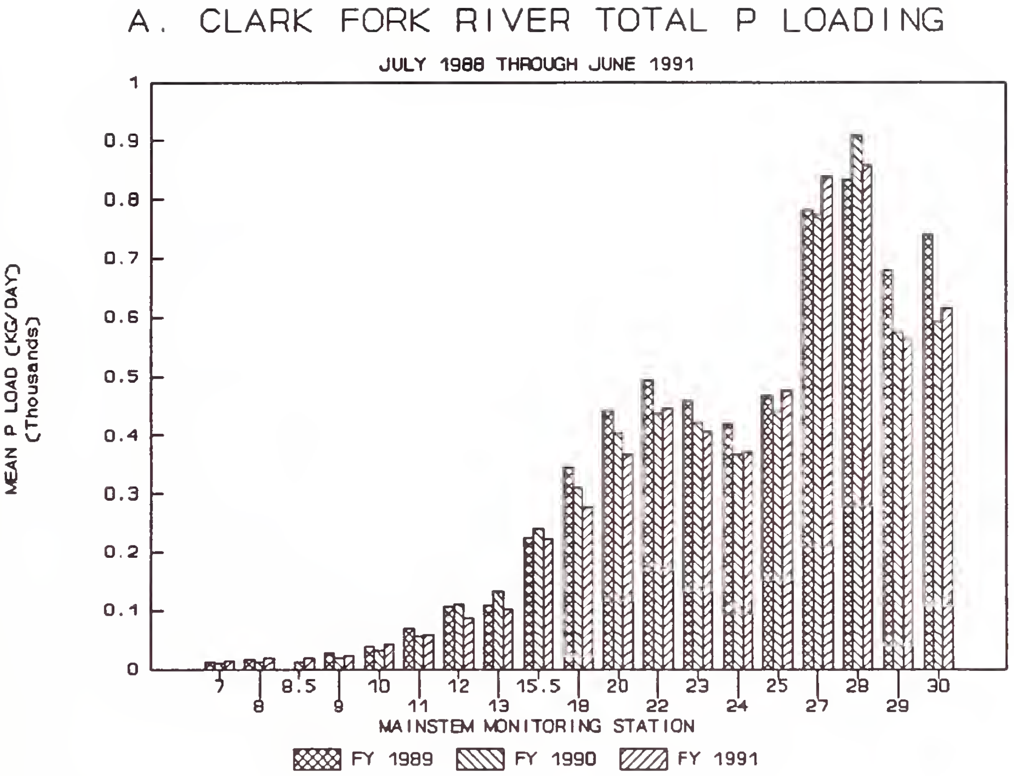
Table 4. Clark Fork Basin Nutrient Load Data Summary

Station Number	FY Monitored	N=	Mean Load (kg/day)			
			SRP	Total P	TSIN	Total N
I. Mainstem Stations						
07	89 90 91	45	3.37	11.9	41.8	124.
08	89 90 91	45	3.38	15.3	65.4	182.
08.5	90 91	30	3.54	15.6	76.4	226.
09	89 90 91	45	4.14	22.8	129.	294.
10	89 90 91	44	11.6	37.6	126.	336.
11	89 90 91	44	20.5	60.7	143.	497.
12	89 90 91	45	33.0	102.	153.	779.
13	89 90 91	45	35.6	114.	160.	960.
15.5	89 90 91	45	55.0	229.	267.	2250.
18	89 90 91	45	131.	310.	676.	2600.
20	89 90 91	45	115.	403.	824.	3700.
22	89 90 91	45	131.	457.	747.	4270.
23	89 90 91	45	119.	428.	678.	4120.
24	89 90 91	45	101.	385.	644.	3770.
25	89 90 91	45	114.	461.	812.	4850.
27	89 90 91	45	99.9	797.	1390.	9620.
28	89 90 91	45	103.	865.	1540.	9940.
29	89 90 91	45	126.	605.	1790.	8740.
30	89 90 91	45	122.	648.	1920.	9710.
II. Tributaries						
00	89 90 91	45	0.85	3.37	40.3	52.7
01	89 90 91	45	37.9	58.7	201.	246.
02	89 90 91	45	16.0	42.5	178.	220.
03	89 90 91	45	11.6	44.6	176.	247.
04	89 90 91	45	2.30	9.72	30.5	83.2
05	89 90 91	43	0.68	2.13	6.91	23.7
06	89 90 91	45	0.31	1.30	5.04	22.7
07.3	89 90 91	45	0.34	1.93	27.4	47.1
08.3	89	15	0.08	0.22	2.06	3.30
08.7	89	15	0.25	0.41	3.27	4.91
09.3	89	15	0.23	0.35	0.09	1.65
10.2	89 90 91	45	6.88	25.5	9.03	135.
10.5	89	15	0.99	30.0	2.81	33.2
10.7	89 90 91	45	6.84	39.6	9.75	92.0
11.5	89 90 91	44	7.75	19.2	23.8	114.
12.5	89 90 91	45	7.75	21.6	9.95	263.
14	89 90 91	45	20.1	119.	159.	1210.
18.5	89 90 91	45	27.8	110.	276.	1500.
19	89 90 91	45	27.9	119.	298.	1540.
22.5	90 91	30	1.03	4.31	3.55	55.9
23.7	90 91	30	1.74	6.78	54.7	192.
23.9	91	15	0.61	2.00	29.9	99.3
24.7	90 91	30	4.23	12.8	30.0	351.

Table 4. Continued

Station	FY				Mean Load (kg/day)			
Number	Monitored			N=	SRP	Total P	TSIN	Total N
II. Tributaries (continued)								
26	89	90	91	45	45.9	304.	756.	4730.
26.6		90	91	30	8.51	15.6	4.71	79.9
26.7		90	91	28	4.09	8.22	43.2	108.
26.8			91	15	11.33	16.3	45.0	109.
26.9		90	91	29	12.57	27.9	91.1	250.
27.5	89	90	91	45	6.22	20.2	13.4	196.
27.7	89	90	91	45	2.49	6.84	10.1	66.8
28.3		90	91	26	3.03	6.48	5.62	50.1
28.5		90	91	30	3.02	5.45	4.14	55.6
28.6			91	15	0.40	1.22	3.86	45.9
29.5		90	91	30	1.71	11.8	62.3	189.
III. Wastewater Discharges								
00.5	89	90	91	45	46.8	53.6	154.	186.
06.5	89			14	0.16	0.36	0.85	2.26
07.7	89			15	0.51	0.56	1.36	1.72
09.5	89	90	91	45	8.56	10.2	25.6	40.0
11.6	89			15	0.30	0.76	0.96	1.58
17	89	90	91	45	82.6	86.4	370.	421.
21*	89	90	91	34	7.72	17.1	40.2	140.
23.5	89			15	0.32	0.38	1.09	1.42
24.5	89	90	91	45	1.36	1.58	4.87	6.66
27.6	89			15	0.45	0.64	0.69	1.57

* Load data given are for total nutrients. Stone wastewater is not filterable. Also note that data are for direct discharges to the Clark Fork only and do not include nutrient loading from groundwater seepage.



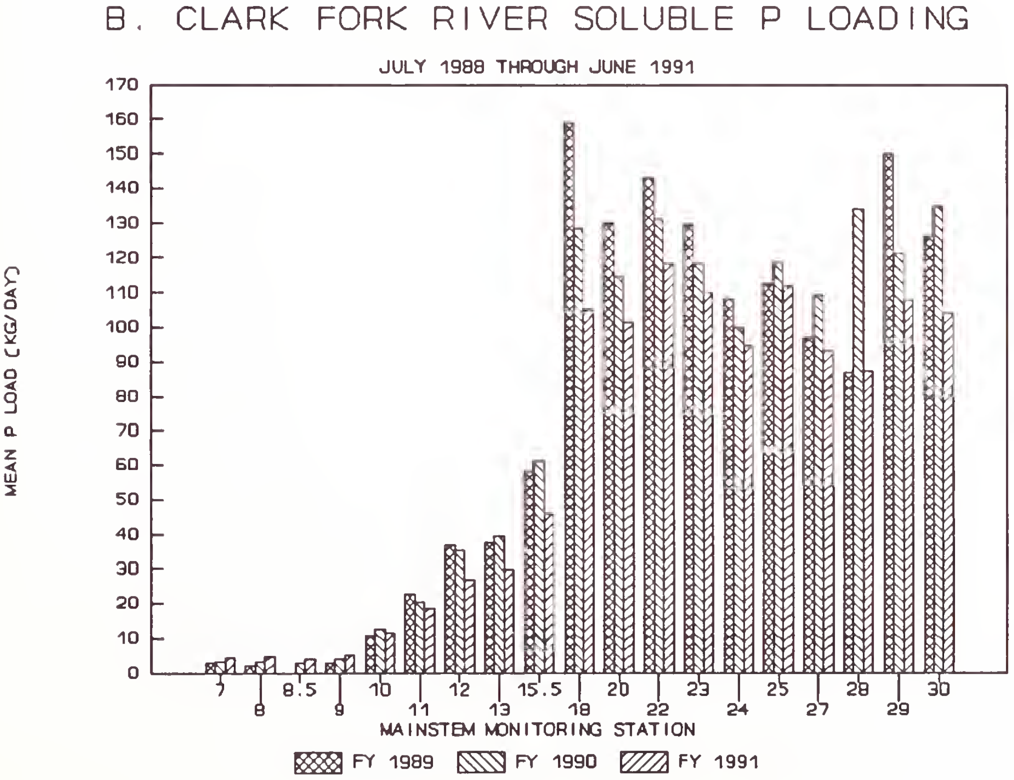
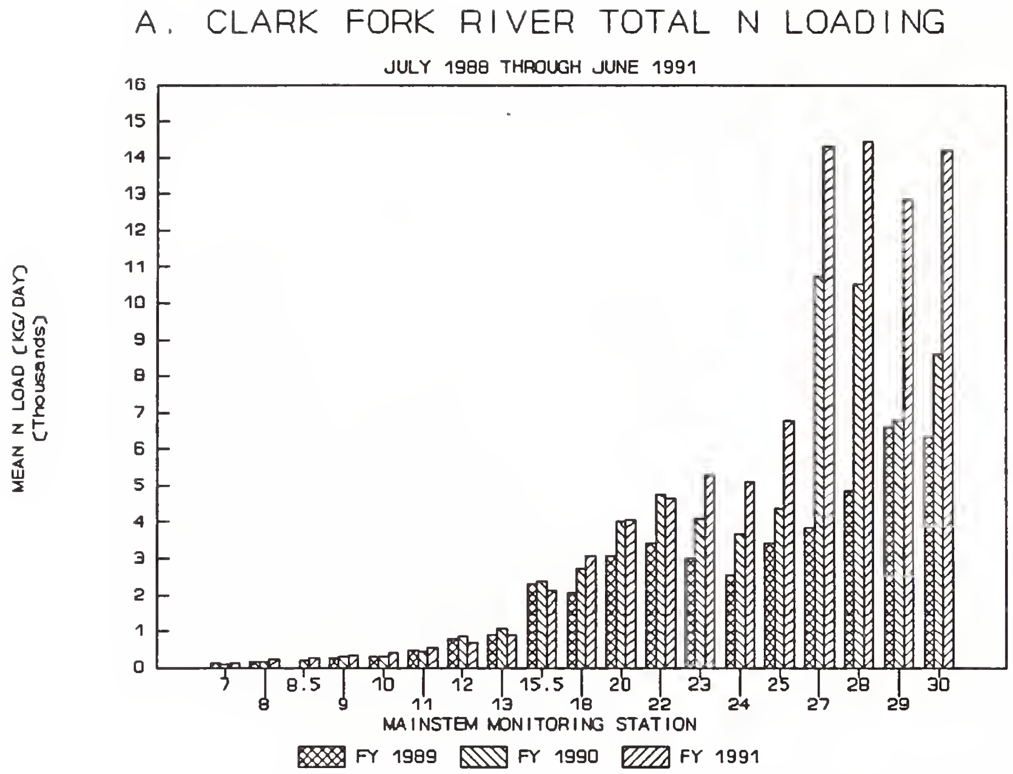


Figure 9. Mean phosphorus loads in the Clark Fork River during State Fiscal Years 1989 - 1991. A - Total P. B - Soluble P.



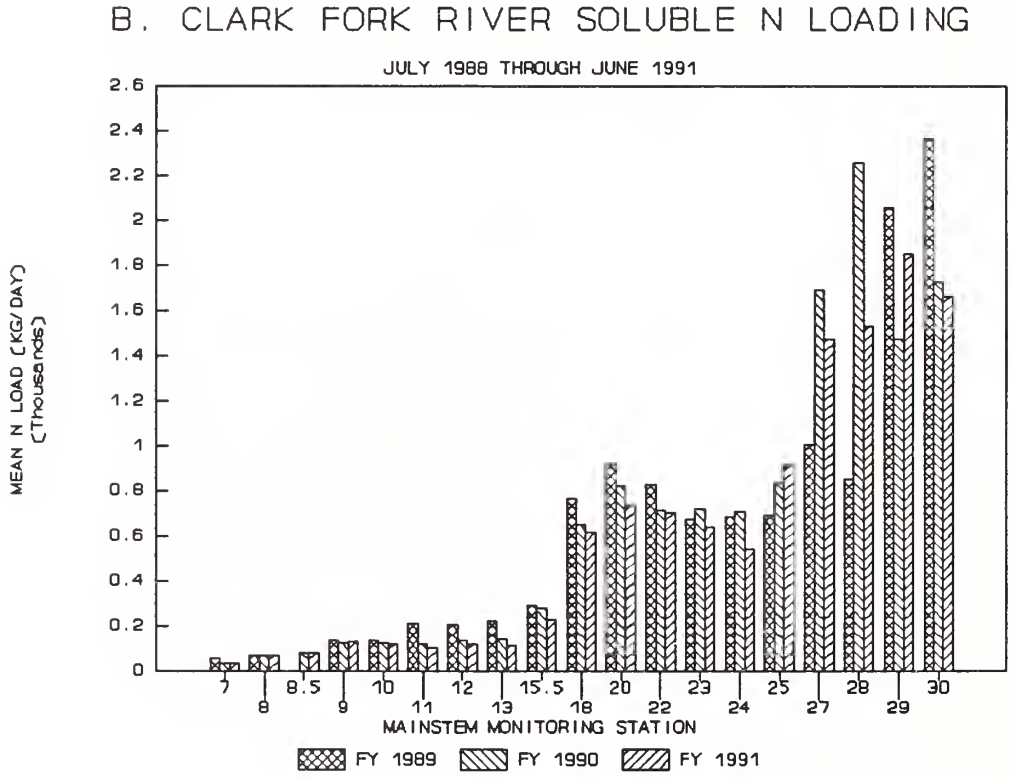
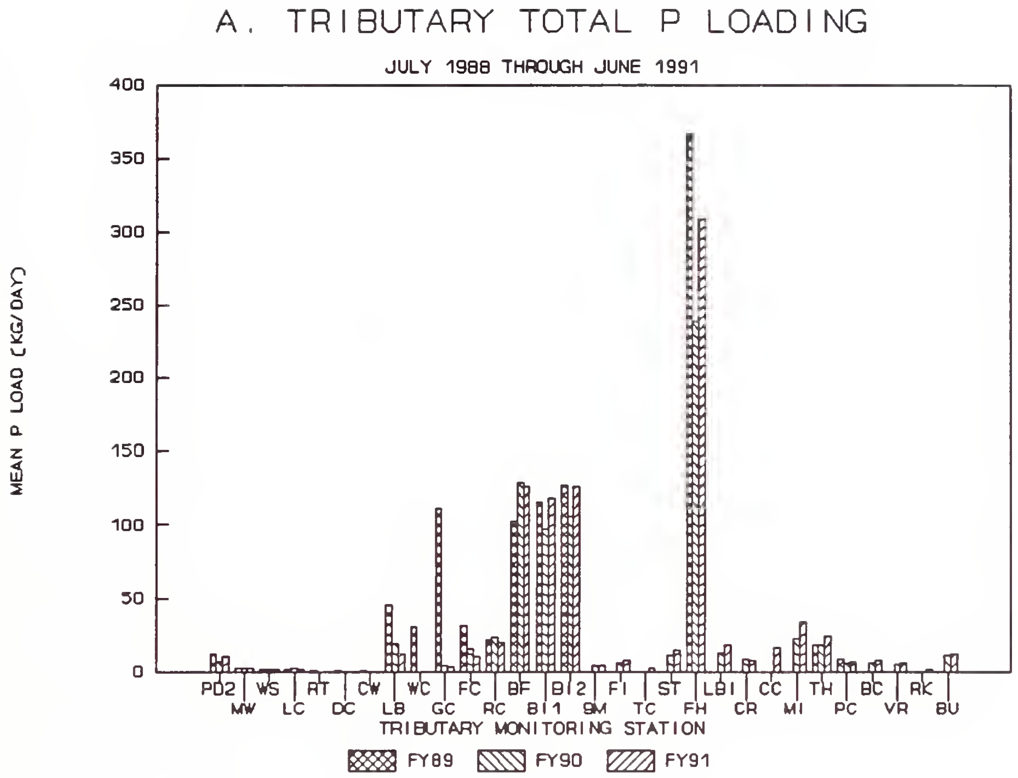


Figure 10. Mean nitrogen loads in the Clark Fork River during State Fiscal Years 1989 - 1991. A - Total N. B - Soluble N.



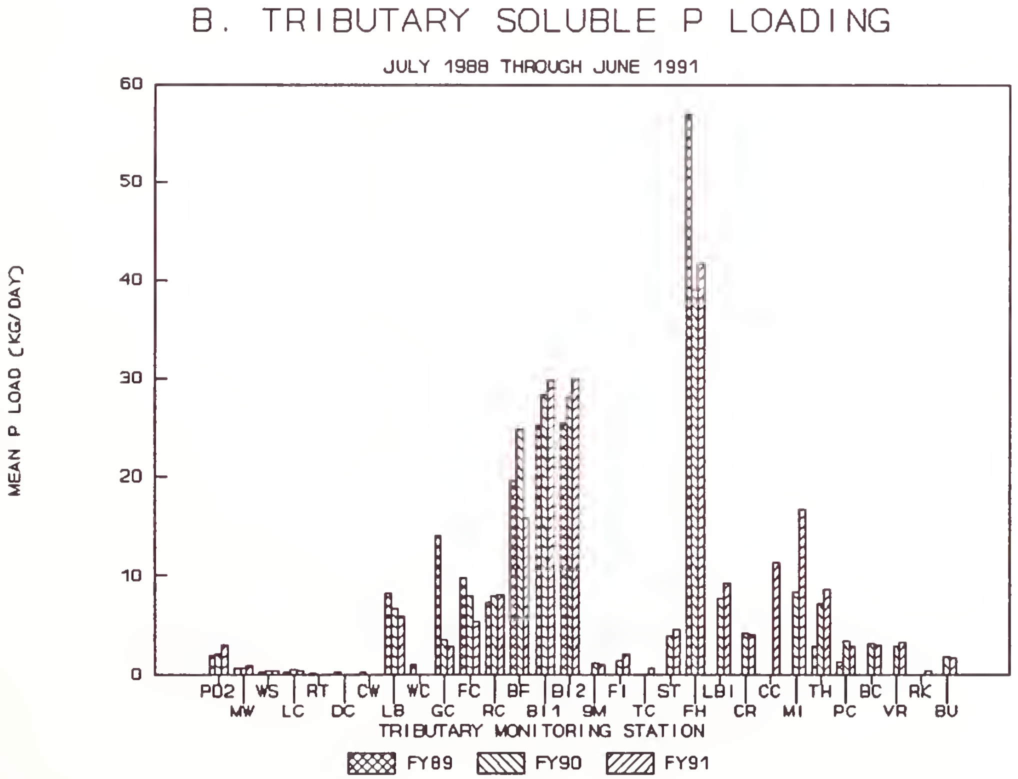
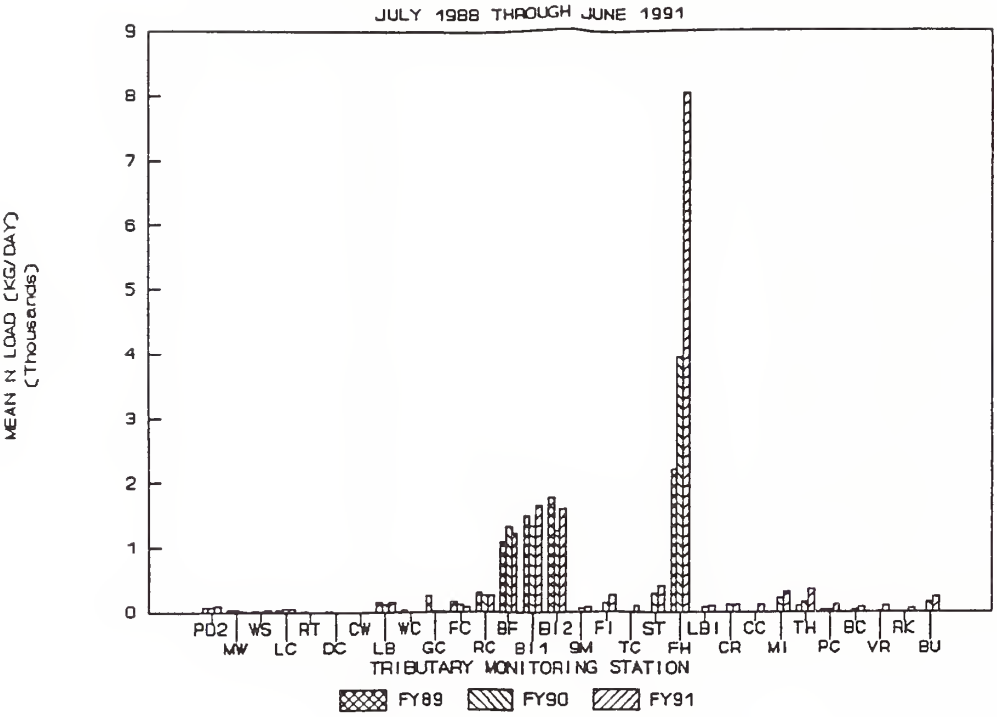
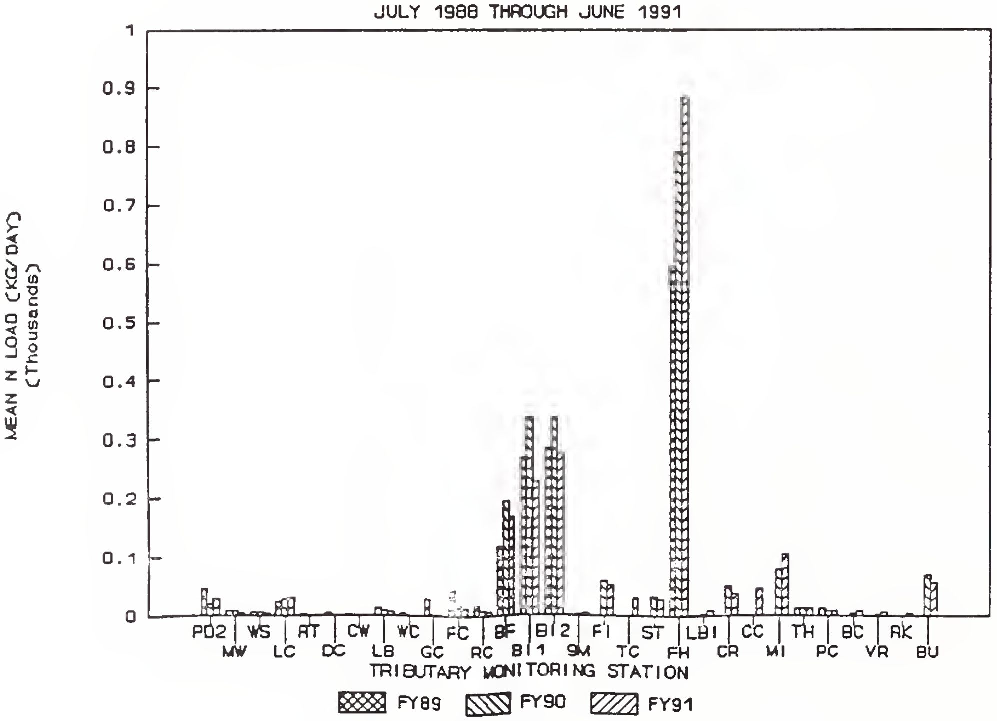


Figure 11. Mean phosphorus loading from selected Clark Fork Basin tributaries during State Fiscal Years 1989 -1991. A - Total P. B - Soluble P.

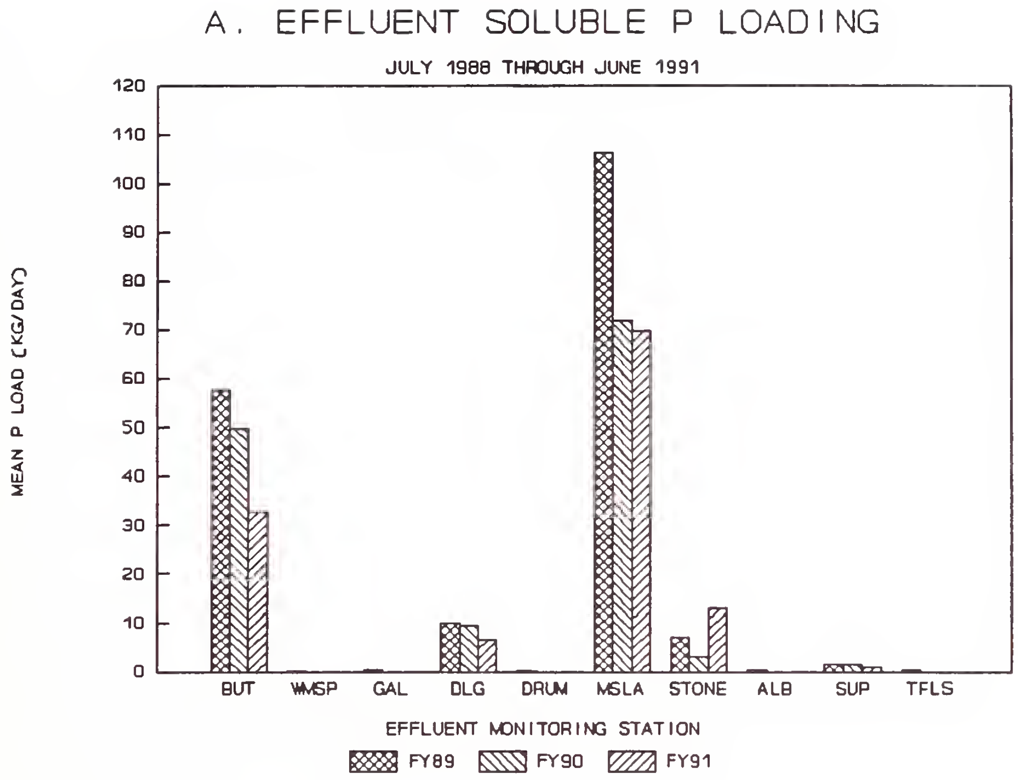


A. TRIBUTARY TOTAL N LOADING



B. TRIBUTARY SOLUBLE N LOADING

Figure 12. Mean nitrogen loading from selected Clark Fork Basin tributaries during State Fiscal Years 1989 - 1991. A - Total N. B - Soluble N.



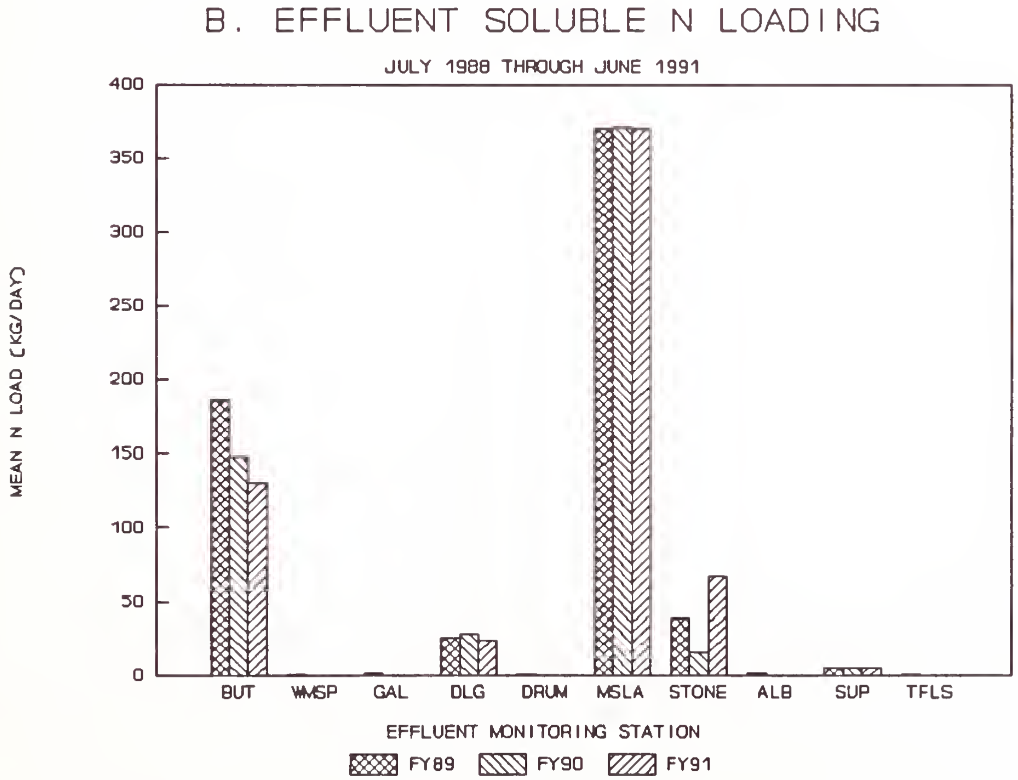
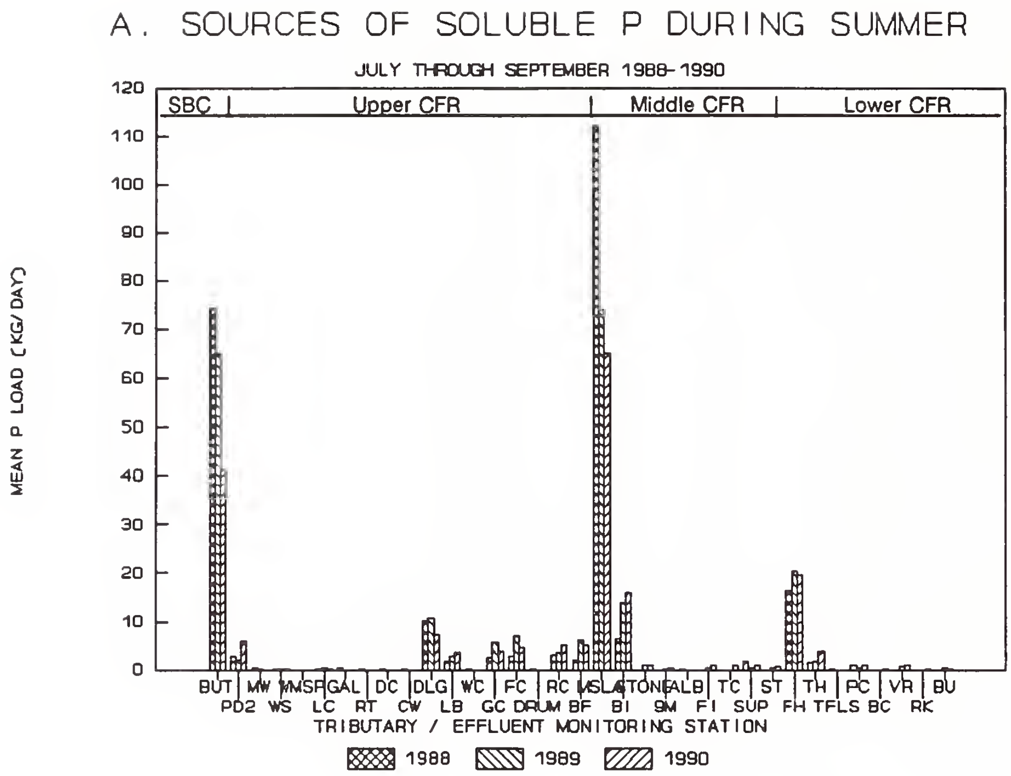
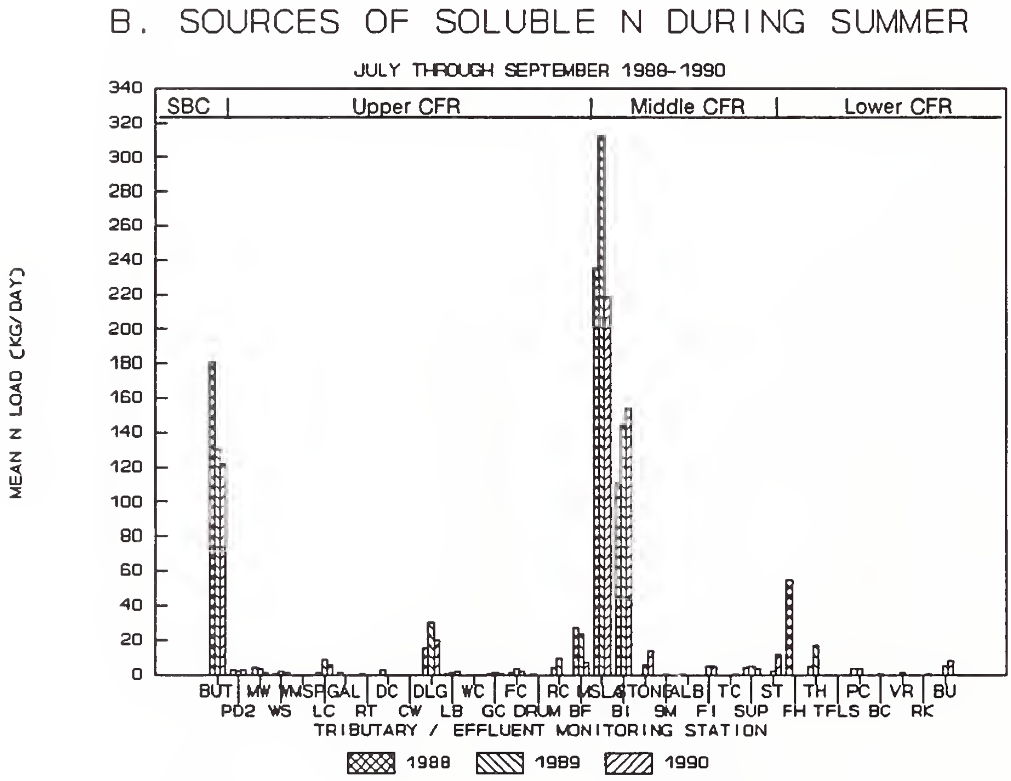


Figure 13. Mean phosphorus and nitrogen loading from selected Clark Fork Basin wastewater discharges during State Fiscal Years 1989 -1991. A - Soluble P. B - Soluble N.


A. SOURCES OF SOLUBLE P DURING SUMMER

JULY THROUGH SEPTEMBER 1988-1990


B. SOURCES OF SOLUBLE N DURING SUMMER

JULY THROUGH SEPTEMBER 1988-1990

Figure 14. Mean phosphorus and nitrogen loading from selected Clark Fork Basin tributaries and wastewater discharges during summer (July through September), 1988-1990. A - Soluble P. B - Soluble N.

5.0 CONCLUSIONS

The Clark Fork River showed marked improvements in quality over the three-year course of the study. Causes were improved streamflow conditions, phosphorus detergent bans at Missoula, Alberton and Superior, and efforts by the Stone Container Corporation to curb wastewater nutrient loading. Observed decreases in municipal wastewater phosphorus loading from Butte and Deer Lodge, and resulting improvements in water quality in the upper Clark, may have been indirectly attributable to the phosphorus bans, by reducing the availability of high phosphorus detergents in these non-ban communities.

Tables 5 and 6 give summary rankings to the Clark Fork tributaries and wastewater discharges on the basis of quality (nutrient concentrations) and quantity (nutrient loads) of nutrients discharged to the Clark Fork River.

All of the wastewater discharges, Silver Bow Creek, a third of the other direct tributaries to the Clark Fork River, and all of the tributaries to the lower Flathead River contained elevated concentrations of nutrients. While nutrient loading from some of the smaller Clark Fork tributaries may have been relatively insignificant, their nutrient-rich inflows may have helped support localized developments of nuisance algae in their mixing zones. These tributaries included Gold, Flint, Dempsey, Lost, Racetrack, and Cottonwood creeks and the Mill-Willow Bypass. Nutrient-related impairment of beneficial water uses in tributary watersheds was not evaluated in this study.

The Missoula, Deer Lodge and Butte WWTP discharges were the sources most responsible for elevated soluble nutrient concentrations in the Clark Fork River. They also provided the largest share of soluble nutrient loading to the reaches where, and during the times of the year when, algae and related problems were most prevalent. This conclusion has not changed despite the highly effective phosphorus detergent bans.

Inflows from tributaries with lower nutrient concentrations were important in diluting soluble nutrient concentrations in the Clark Fork. The most important of these included Warm Springs Creek near Warm Springs, the Little Blackfoot River, Rock Creek near Clinton, and the Blackfoot, Bitterroot and Flathead rivers.

Overall, soluble P loading from tributaries was about equal to that contributed by wastewater discharges (Figure 15). About three-fourths of the soluble N loading came from tributaries. These findings are particularly relevant to the long-term management of Lake Pend Oreille.

Tributary sources of soluble nutrient loading were dominated by the Flathead, Bitterroot, and Blackfoot Rivers (Figure 16). Up to a half of the soluble N load in the lower Bitterroot River during summer was attributable to the discharge of contaminated groundwater from the Missoula area. Mission Creek, its tributary Coleman Coulee, Crow Creek, and the Little Bitterroot River were responsible for a large share of the Flathead River's soluble nutrient load. Rock Creek near Clinton, Flint and Gold Creeks, and the Little Blackfoot and Thompson rivers were smaller but important sources of soluble P loading. The Bull River and Fish Creek were significant sources of soluble N loading.

The Missoula, Butte and Deer Lodge municipal wastewater treatment facilities and the Stone Container Corporation kraft mill discharged the majority of the soluble nutrient loading from effluents (Figure 17).

During this study, most of the nutrient load from Butte was assimilated in Silver Bow Creek or removed in the Warm Springs treatment ponds before it could reach the Clark Fork River. Over the long term, the nutrient removal efficiency of the ponds may be less than we documented. Floods, pond bypass events, and wind-driven resuspension of pond sediments can all be expected to decrease the effectiveness of the ponds as a nutrient trap.

Nutrient loading from the Butte, Deer Lodge, Missoula and Superior municipal wastewater discharges showed substantial decreases over the study period as a result of the phosphorus detergent bans and possibly other factors.

Nutrient loading from the Stone Container Corporation kraft mill increased in the last year of the study but was down several-fold from earlier years as a result of in-plant control measures. Nutrient loading to the Clark Fork from groundwater seepage down gradient of Stone's wastewater ponds was not evaluated in this study.

During summer, when algae problems were at their peak, most of the nutrient loading to the Clark Fork above the Flathead River was provided by a handful of sources (Figure 18). Management efforts to reduce nutrient-related use impairment in the Clark Fork River should logically be directed at the Missoula, Deer Lodge and Butte municipal wastewater discharges, as well as point and nonpoint sources in the Bitterroot drainage and other tributaries.

Table 5. Ranking of Clark Fork Basin Nutrient Sources by Mean Concentrations of Soluble Phosphorus and Nitrogen

Source	Mean SRP Concentration (µg/l)*	Source	Mean TSIN Concentration (µg/l)*
I. Tributaries			
Coleman Coulee	220	Coleman Coulee	738
Little Bitterroot River	104	Dempsey Creek	460
Gold Creek	87	Silver Bow Creek	318
Flint Creek	37	Lost Creek	303
Crow Creek	30	Crow Creek	293
Silver Bow Creek	30	Mission Creek	224
Cottonwood Creek	30	Mill-Willow Bypass	218
Dempsey Creek	29	Racetrack Creek	210
Mission Creek	27	Warm Springs Creek (Phosphate)	90
Warm Springs Creek (Phosphate)	21	Warm Springs Creek (Warm Springs)	82
Little Blackfoot River	19	Bitterroot River (near mouth)	81
Mill-Willow Bypass	9	Flint Creek	75
Racetrack Creek	8	Bitterroot River (at HW93)	73
Bitterroot River (at HW93)	6	Little Bitterroot River	68
Rock Creek (Clinton)	6	Trout Creek	59
Bitterroot River (near mouth)	6	Gold Creek	57
Beaver Creek	6	Fish Creek	42
Lost Creek	5	Bull River	40
Warm Springs Creek (Warm Springs)	5	Blackfoot River	38
Vermilion River	4	Cottonwood Creek	32
Thompson River	4	Flathead River	24
Prospect Creek	4	Rock Creek (Noxon)	20
Ninemile Creek	4	Little Blackfoot River	20
Trout Creek	4	Prospect Creek	16
Blackfoot River	4	Thompson River	15
Fish Creek	2	St. Regis River	15
St. Regis River	2	Ninemile Creek	14
Rock Creek (Noxon)	2	Rock Creek (Clinton)	12
Flathead River	2	Beaver Creek	<10
Bull River	1	Vermilion River	<10
II. Wastewater Discharges			
Town of Alberton	4420	City of Superior	15742
City of Superior	4411	City of Missoula	15480
City of Missoula	3480	Town of Alberton	13612
Galen State Hospital	2712	City of Butte	8715
City of Butte	2600	Galen State Hospital	7414
City of Thompson Falls	2207	City of Deer Lodge	5453
City of Deer Lodge	1742	City of Thompson Falls	3737
Town of Drummond	613	Town of Drummond	1837
Stone Container Corporation	325	Stone Container Corporation	1405
Warm Springs State Hospital	195	Warm Springs State Hospital	987

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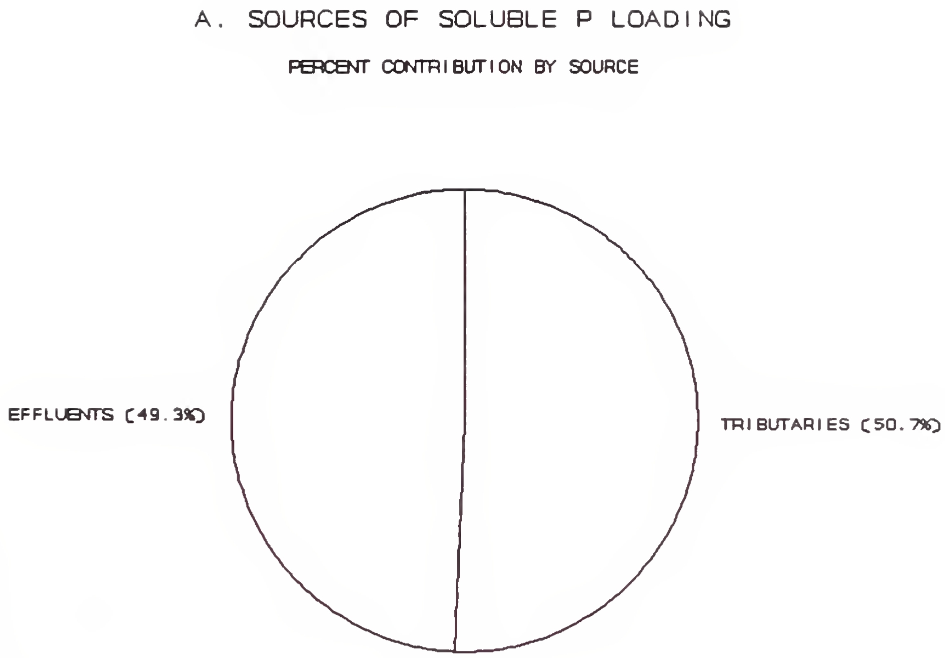
* Based on 14 to 45 measurements made from July 1988 through June 1991.

Table 6. Ranking of Clark Fork Basin Nutrient Sources by Mean Loads of Soluble Phosphorus and Nitrogen

Source	Mean SRP Load (kg/day)*	Source	Mean TSIN Load (kg/day)*
I. Tributaries			
Flathead River	45.9	Flathead River	756.
Bitterroot River	27.9	Bitterroot River	298.
Blackfoot River	20.1	Blackfoot River	159.
Mission Creek (below Coleman Coulee)	12.6	Mission Creek (below Coleman Coulee)	91.1
Coleman Coulee	11.3	Bull River	62.3
Little Bitterroot River	8.51	Fish Creek	54.7
Flint Creek	7.75	Coleman Coulee	45.0
Rock Creek (Clinton)	7.75	Crow Creek	43.2
Little Blackfoot River	6.88	Silver Bow Creek	30.5
Gold Creek	6.84	St. Regis River	30.0
Thompson River	6.22	Trout Creek	29.9
St. Regis River	4.23	Lost Creek	27.4
Crow Creek	4.09	Flint Creek	23.8
Beaver Creek	3.03	Groundwater inflows to Bitterroot River	21.9
Vermilion River	3.02	Thompson River	13.4
Prospect Creek	2.49	Prospect Creek	10.1
Silver Bow Creek	2.30	Rock Creek (Clinton)	9.95
Fish Creek	1.74	Gold Creek	9.75
Bull River	1.71	Little Blackfoot River	9.03
Ninemile Creek	1.03	Mill-Willow Bypass	6.91
Warm Springs Creek (Phosphate)	0.99	Beaver Creek	5.62
Mill-Willow Bypass	0.68	Warm Springs Creek (Warm Springs)	5.04
Trout Creek	0.61	Little Bitterroot River	4.71
Rock Creek (Noxon)	0.40	Vermilion River	4.14
Lost Creek	0.34	Rock Creek (Noxon)	3.86
Warm Springs Creek (Warm Springs)	0.31	Ninemile Creek	3.55
Dempsey Creek	0.25	Dempsey Creek	3.27
Cottonwood Creek	0.23	Warm Springs Creek (Phosphate)	2.81
Racetrack Creek	0.08	Racetrack Creek	2.06
		Cottonwood Creek	0.09
II. Wastewater Discharges			
City of Missoula	82.6	City of Missoula	370.
City of Butte	46.8	City of Butte	155.
City of Deer Lodge	8.56	Stone Container Corporation	40.2
Stone Container Corporation	7.72	City of Deer Lodge	25.6
City of Superior	1.36	City of Superior	4.87
Galen State Hospital	0.51	Galen State Hospital	1.36
City of Thompson Falls	0.45	Town of Alberton	1.09
Town of Alberton	0.32	Town of Drummond	0.96
Town of Drummond	0.30	Warm Springs State Hospital	0.85
Warm Springs State Hospital	0.16	City of Thompson Falls	0.69

* Based on 14 to 45 measurements made from July 1988 through June 1991.



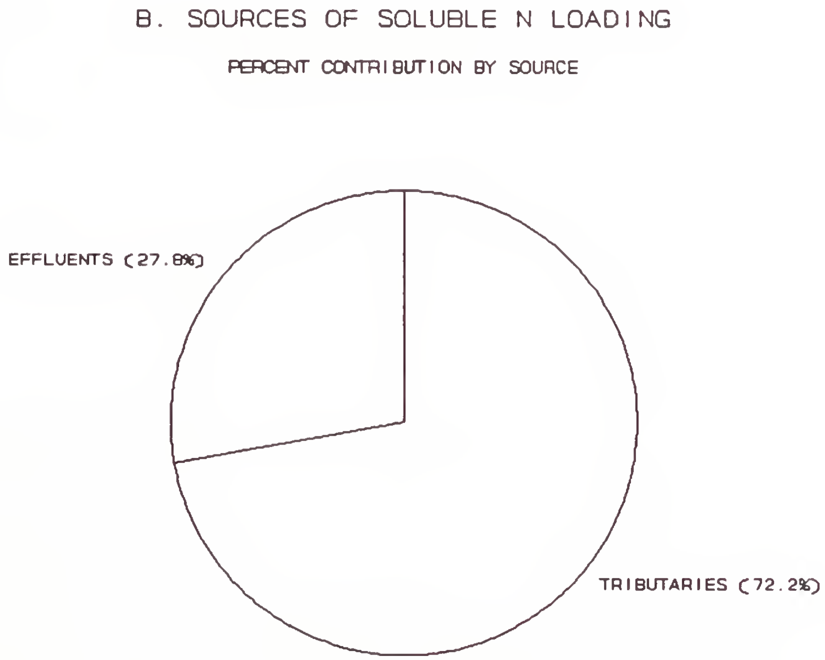


Figure 15. Relative contributions of phosphorus and nitrogen from selected Clark Fork Basin tributaries and wastewater discharges for the period July 1988 through June 1991. Data are percentages of total loading from all monitored sources. A - Soluble P. B - Soluble N.

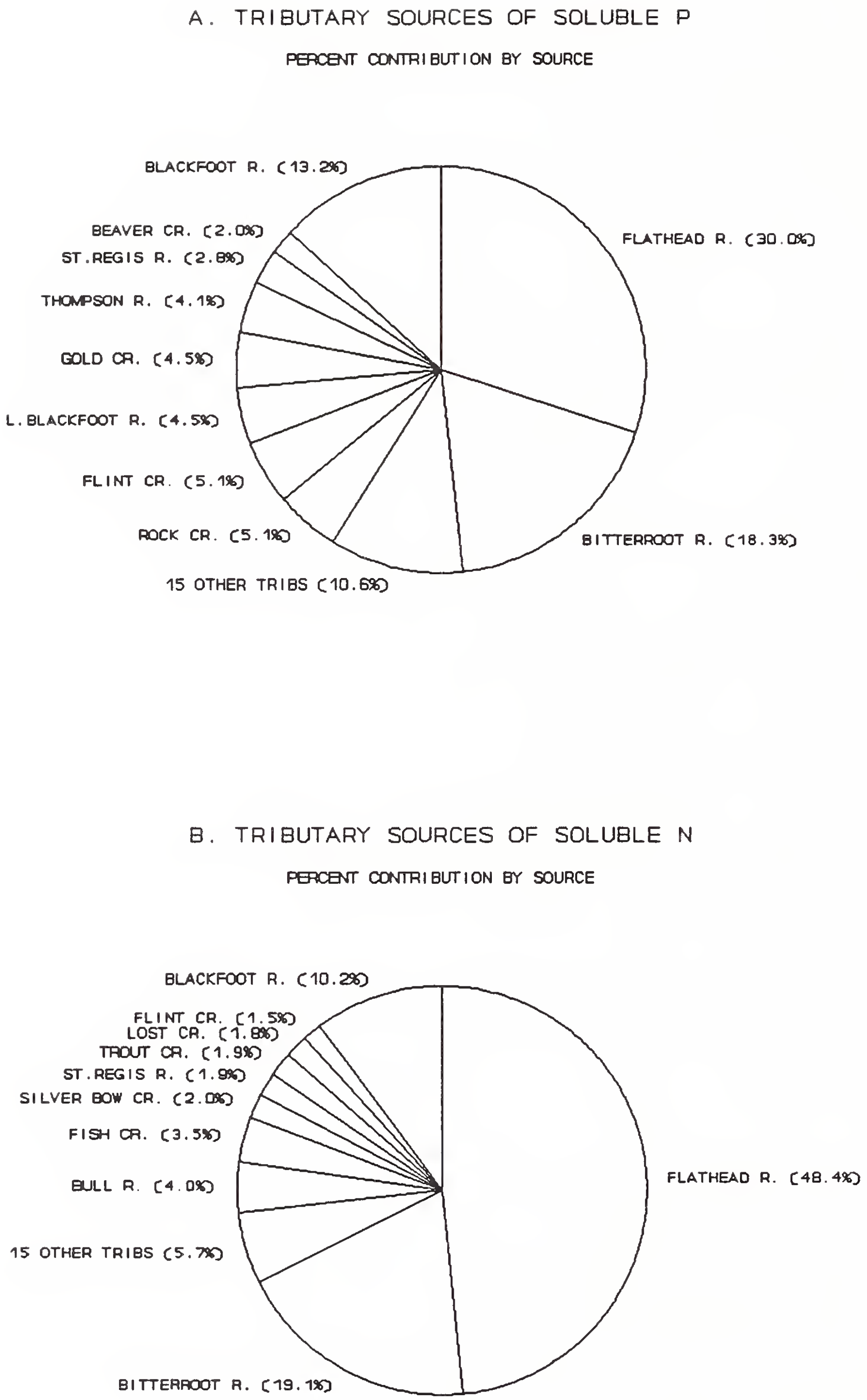
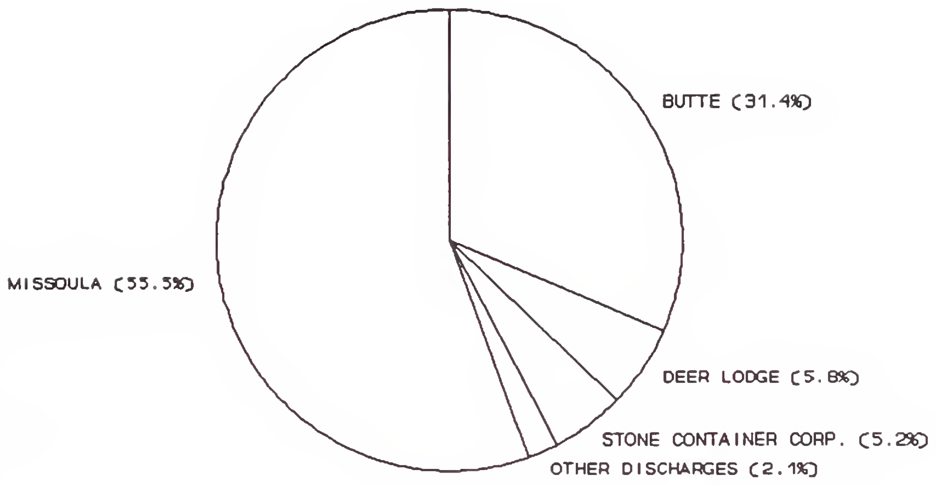


Figure 16. Relative contributions of phosphorus and nitrogen loading from selected Clark Fork Basin tributaries for the period July 1988 through June 1991. Data are percentages of total loading from all monitored tributary sources. A - Soluble P. B - Soluble N.

A. EFFLUENT SOURCES OF SOLUBLE P

PERCENT CONTRIBUTION BY SOURCE



B. EFFLUENT SOURCES OF SOLUBLE N

PERCENT CONTRIBUTION BY SOURCE

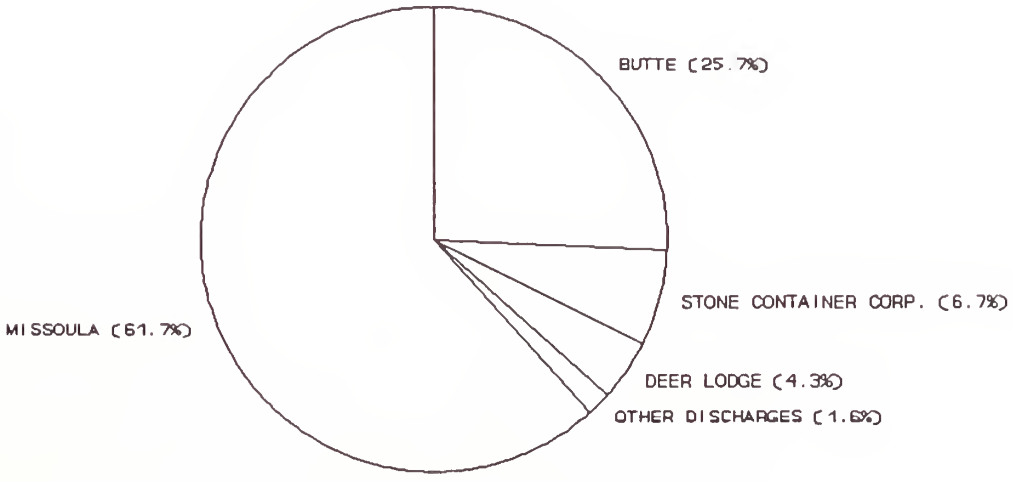


Figure 17. Relative contributions of phosphorus and nitrogen loading from selected Clark Fork Basin wastewater discharges for the period July 1988 through June 1991. Data are percentages of total loading from all monitored wastewater sources. A - Soluble P. B - Soluble N.

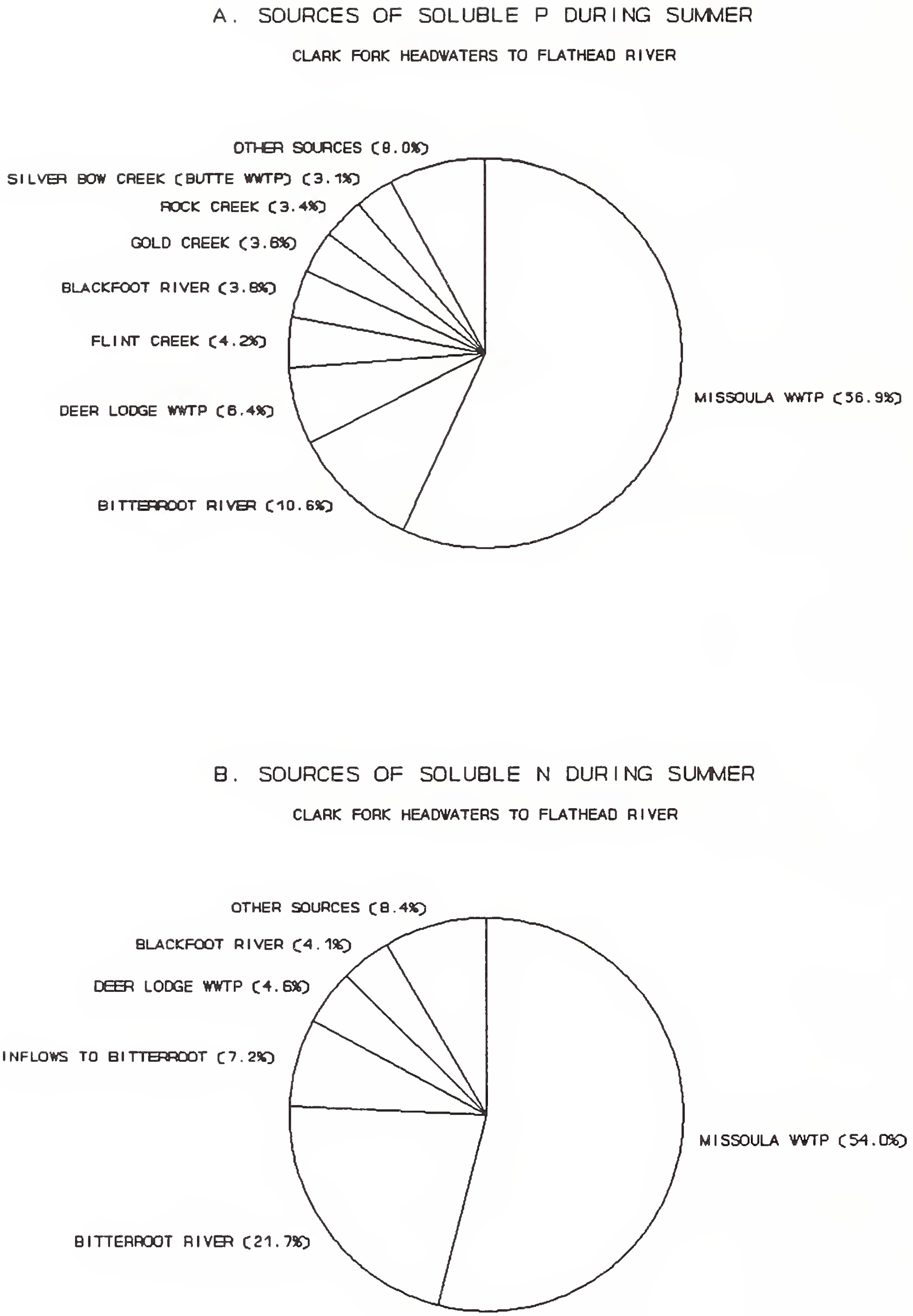


Figure 18. Relative contributions of phosphorus and nitrogen loading to the Clark Fork River above the Flathead River confluence from selected tributaries and wastewater discharges during summer (July through September 1988-1990). Data are percentages of total loading from all monitored sources.
A - Soluble P. B - Soluble N.

6.0 MANAGEMENT STRATEGY

Objectives of the Section 525 assessment of the Clark Fork-Pend Oreille Basin include the development of strategies for the maintenance or enhancement of basin-wide water resources. From the beginning of the 525 project, Montana has focused its efforts on nutrients and eutrophication issues. Consequently, we will be developing a management strategy aimed at reducing and preventing nutrient-caused use impairment in the Clark Fork Basin. The nutrient source inventory addressed in this report and other 525 studies will provide the foundation for that report.

In the coming months, Montana, Idaho and Washington management plans will be merged into a single comprehensive basin-wide management plan. That plan will establish a course of action and a framework for systematic, cooperative management of water resources in the Clark Fork Basin.

7.0 REFERENCES

Bahls, L., M. Fillinger, R. Greene, A. Horpestad, G. Ingman and E. Weber. 1979a. Biological Water Quality Monitoring: Northwest Montana, 1977-1978. Montana Department of Health and Environmental Sciences. November 1979.

Bahls, L.L., G.L. Ingman and A.A. Horpestad. 1979b. Biological Water Quality Monitoring: Southwest Montana, 1977-1978. Montana Department of Health and Environmental Sciences. February 1979.

Carey, J.H. 1991. Phosphorus Sources in Gold Creek, a Tributary of the Clark Fork River in Western Montana. MS Thesis. University of Montana. November 1991.

Clark, K.W. 1986. Interactions between the Clark Fork River and the Missoula Aquifer. MS Thesis. University of Montana. 1986.

Coots, R. and B. Carey. 1991. Pend Oreille River Fishery/Rotovation Study. Washington Department of Ecology. March 1991.

Frenzel, S.A. 1991. Hydrologic Budgets, Pend Oreille Lake, Idaho, 1989-1990. U.S. Geological Survey in cooperation with Idaho Dept. of Health and Welfare. 1991.

Greene, J.C., M. Long, C.L. Bartels and J.U. Nwosu. 1986. Results of Algal Assays Performed on Waters Collected from Silver Bow Creek, the Warm Springs Pond and the Upper Clark Fork River: May 10-16, 1985. U.S. Environmental Protection Agency. May 1986.

Idaho Department of Health and Welfare. 1989. Compilation of Water Quality Study Efforts on Pend Oreille Lake, 1984-1988, Bonner and Kootenai Counties, Idaho. Division of Environment Quality, Water Quality Bureau. 1989.

Ingman, G.L. and M.A. Kerr. 1989a. Clark Fork River Basin Nutrient Pollution Source Assessment - Interim Report to the Section 525 Clean Water Act Study Steering Committee. Montana Department of Health and Environmental Sciences. April 1989.

Ingman, G.L. and M.A. Kerr. 1989b. An Evaluation of the Instream Effects of Reduced Wastewater Nutrient Loading from the Stone Container Corporation Missoula Mill. Montana Department of Health and Environmental Sciences. September 1989.

Ingman, G.L. and M.A. Kerr. 1990. Water Quality in the Clark Fork River Basin, Montana, State Fiscal Years 1988-1989. Final Project Report to the Resource Indemnity Trust Grant Program. Montana Department of Health and Environmental Sciences. January 1990.

Johnson, H.E. and C.L. Schmidt. 1988. Clark Fork Basin Project Status Report and Action Plan. Clark Fork Basin Project. Montana Governor's Office. December 1988.

Montana Department of Health and Environmental Sciences. 1985 Draft Environmental Impact Statement for Champion International Frenchtown Mill Discharge Permit MT-0000035. December 1985.

Montana Department of Health and Environmental Sciences. 1986. Montana Water Quality -- The 1986 Montana 305(b) Report. May 1986.

Montana Department of Health and Environmental Sciences. 1988a. Preliminary Environmental Review - Missoula wastewater treatment plan MPDES Permit No. MT-0022594. January 1988.

Montana Department of Health and Environmental Sciences. 1988b. Clark Fork River Basin Expanded Nutrient Monitoring Program Work Plan. February 1988.

Montana Department of Health and Environmental Sciences. 1988c. Lab Procedures Manual - Analysis and Reporting of Water Quality Samples. Revised March 1988.

Montana Department of Health and Environmental Sciences. 1990. Water Quality -- The 1990 Montana 305 (b) Report. June 1990.

Pasco, W. 1992. Telephone conversation with William Pasco, chief operator, Butte Metro municipal wastewater treatment plant. January 13, 1992.

Pelletier, G. and R. Coots. 1990. Progress Report No. 1 - Pend Oreille River Quality Study. Washington Department of Ecology. March 1990.

Shields, R.R. 1990. Letter to Gary Ingman summarizing the results of groundwater discharge measurements in the lower Bitterroot River. February 9, 1990.

Stone Container Corporation. 1990. Stone's position on (the) nutrient (reduction) goal (contained in MPDES Permit No. MT-0000035). July 1990.

U.S. Environmental Protection Agency. 1983. Methods for the Chemical Analysis of Water and Wastes. EPA 600/4-79-020. March 1983.

U.S. Environmental Protection Agency. 1986. Quality Criteria for Water. EPA 440/5-86-001. May 1986.

Ver Hey, M.E. 1987. Contributions to Potable Water Contamination from Septic System Effluent. MS Thesis. University of Montana. 1987.

Watson, V. 1985. A Synthesis of Water Quality Problems in the Clark Fork River Basin. In Proceedings of the Clark Fork River Symposium. Montana Academy of Sciences, Montana College of Mineral Science and Technology. April 1985.

Watson, V. 1990. Control of Algal Standing Crop by P and N in the Clark Fork River. In Proceedings of the Clark Fork River Symposium. Montana Academy of Sciences. April 1990.

Watson, V. 1991. Evaluation of the Benefits of Nutrient Reductions on Algal Levels in the Clark Fork River. Final contract report to the Montana Department of Health and Environmental Sciences. June 1992.

8.0 ACKNOWLEDGEMENTS

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APPENDIX A

STATE FISCAL YEAR 1991

CLARK FORK BASIN NUTRIENT MONITORING DATA

MAINSTEM MONITORING STATIONS

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:07 Clark Fork below Warm Springs Creek

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	36.5 (I)	22.7	9.04	53	77	30	10 <	400	30
Aug 06	22.9 (I)	21.4	9.01	30	52	10	10 <	500	10
Sep 12	49.3 (I)	16.7	8.83	40	67	10	10 <	300	10
Oct 16	79.2 (I)	4.8	8.20	7	29	40	10 <	400	40
Nov 14	70.0 (E)	4.3	7.94	6	21	50	10 <	400	50
Dec 19	37.6 (I)	0.0	8.25	14	39	320	80	400	400
Jan 15	60.1 (I)	0.8	7.85	20	46	370	100	500	470
Feb 12	51.4 (I)	1.8	7.71	19	53	410	180	100	590
Mar 13	85.3 (I)	1.9	7.81	9	94	340	60	500	400
Apr 08	83.1 (I)	3.1	7.68	7	117	240	20	800	260
Apr 23	71.3 (I)	10.3	8.14	6	86	30	20	500	50
May 14	124.0 (I)	9.3	8.00	14	57	160	40	400	200
May 29	321.6 (I)	11.3	8.80	20	49	60	10 <	900	60
Jun 11	598.4 (E)	12.4	8.45	18	57	20	10 <	400	20
Jun 24	338.8 (E)		7.92	16	37	20	10 <	300	20
N=	15	14	15	15	15	15	15	15	15
Max	598.4	22.7	9.04	53	117	410	180	900	590
Min	22.9	0.0	7.68	6	21	10	10 <	100	10
Mean	135.3	8.6	8.24	19	59	141	33	453	174

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN
Station: 07 Clark Fork below Warm Springs Creek

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	36.5	22.7	9.04	53	77	30	10 <	400	30
AUG	1	22.9	21.4	9.01	30	52	10	10 <	500	10
SEP	1	49.3	16.7	8.83	40	67	10	10 <	300	10
OCT	1	79.2	4.8	8.20	7	29	40	10 <	400	40
NOV	1	70.0	4.3	7.94	6	21	50	10 <	400	50
DEC	1	37.6	0.0	8.25	14	39	320	80	400	400
JAN	1	60.1	0.8	7.85	20	46	370	100	500	470
FEB	1	51.4	1.8	7.71	19	53	410	180	100	590
MAR	1	85.3	1.9	7.81	9	94	340	60	500	400
APR	2	77.2	6.7	7.91	7	102	135	20	650	155
MAY	2	222.8	10.3	8.40	17	53	110	20	650	130
JUN	2	468.6	12.4	8.19	17	47	20	10 <	350	20
N=	15	12	12	12	12	12	12	12	12	12
Max		468.6	22.7	9.04	53	102	410	180	650	590
Min		22.9	0.0	7.71	6	21	10	10 <	100	10
Mean		105.1	8.7	8.26	20	57	154	38	429	192
Annual Nutrient Load (tons/year)					1.74	5.54	11.22	2.38	45.42	13.60

Frequency of Exceedence	
Phosphorus Criterion	58%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	1.1 X
Nitrogen Criterion	0.2 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.66
NITROGEN	0.00
CUMULATIVE SCORE	0.66

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%
Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:08 Clark Fork near Dempsey

Instantaneous Values

Date	Streamflow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	8.7 (I)	15.5	8.05	22	36	70	10 <	300	70
Aug 07	3.0 (I)	14.2	7.89	12	22	40	10 <	200	40
Sep 11	68.3 (I)	15.8	8.39	14	34	20	10 <	400	20
Oct 17	121.8 (I)	2.3	8.09	4	26	40	10 <	300	40
Nov 15	128.0 (I)	1.6	8.04	4	18	130	10 <	100	130
Dec 19	80.0 (E)	0.0	8.14	17	52	490	40	400	530
Jan 16	119.3 (I)	0.2	7.73	19	45	440	70	600	510
Feb 13	115.0 (I)	1.6	8.03	15	46	470	90	100 <	560
Mar 14	122.5 (I)	1.6	8.44	15	49	320	10 <	500	320
Apr 09	145.0 (I)	2.4	8.01	5	81	290	10 <	600	290
Apr 24	123.6 (I)	9.0	8.10	7	82	120	10 <	500	120
May 15	188.7 (I)	9.3	8.02	17	94	240	30	1000	270
May 30	320.0 (I)	10.0	8.13	17	67	70	10 <	900	70
Jun 12	715.0 (E)	10.2	8.47	21	80	30	10 <	600	30
Jun 25	311.0 (I)	10.1	7.95	15	39	40	10 <	300	40
N=	15	15	15	15	15	15	15	15	15
Max	715.0	15.8	8.47	22	94	490	90	1000	560
Min	3.0	0.0	7.73	4	18	20	10 <	100 <	20
Mean	171.3	6.9	8.10	14	51	187	15	447	203

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Station: 08 Clark Fork near Dempsey

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	8.7	15.5	8.05	22	36	70	10 <	300	70
AUG	1	3.0	14.2	7.89	12	22	40	10 <	200	40
SEP	1	68.3	15.8	8.39	14	34	20	10 <	400	20
OCT	1	121.8	2.3	8.09	4	26	40	10 <	300	40
NOV	1	128.0	1.6	8.04	4	18	130	10 <	100	130
DEC	1	80.0	0.0	8.14	17	52	490	40	400	530
JAN	1	119.3	0.2	7.73	19	45	440	70	600	510
FEB	1	115.0	1.6	8.03	15	46	470	90	100 <	560
MAR	1	122.5	1.6	8.44	15	49	320	10 <	500	320
APR	2	134.3	5.7	8.06	6	82	205	10 <	550	205
MAY	2	254.4	9.7	8.08	17	81	155	15	950	170
JUN	2	513.0	10.2	8.21	18	60	35	10 <	450	35
N=	15	12	12	12	12	12	12	12	12	12
Max		513.0	15.8	8.44	22	82	490	90	950	560
Min		3.0	0.0	7.73	4	18	20	10 <	100 <	20
Mean		139.0	6.5	8.10	14	46	201	18	396	219
Annual Nutrient Load (tons/year)					1.94	7.43	23.91	2.06	65.16	25.97

Frequency of Exceedence	
Phosphorus Criterion	29%
Nitrogen Criterion	0%

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.9 X
Nitrogen Criterion	0.2 X

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.27
NITROGEN	0.00

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

CUMULATIVE SCORE	0.27

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN
Monitoring Station:08.5 Clark Fork at Sager Lane Bridge
Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	16.3 (I)	15.9	8.28	16	32	150	10 <	300	150
Aug 07	10.2 (I)	14.9	8.18	4	13	120	10 <	200	120
Sep 11	72.3 (I)	17.2	8.73	5	22	20	10 <	300	20
Oct 17	119.1 (I)	3.1	8.30	2	19	50	10 <	200	50
Nov 15	144.2 (I)	1.6	8.16	4	15	150	10	200	160
Dec 19	100.0 (E)	0.0	8.27	9	28	630	20	300	650
Jan 16	134.9 (I)	0.2	8.47	16	38	440	50	1100	490
Feb 13	127.6 (I)	1.4	8.04	14	56	470	60	200	530
Mar 14	158.0 (I)	2.2	8.29	6	46	300	10 <	400	300
Apr 09	168.4 (I)	2.5	8.04	4	68	290	10 <	500	290
Apr 24	153.1 (I)	9.0	8.02	3	67	140	10 <	400	140
May 15	196.8 (I)	10.8	8.08	14	77	250	20	900	270
May 30	323.6 (I)	10.2	8.13	17	72	90	10 <	1100	90
Jun 12	570.0 (E)	11.0	8.26	22	97	30	10 <	600	30
Jun 25	350.0 (I)	10.7	7.93	14	42	40	10 <	300	40
N=	15	15	15	15	15	15	15	15	15
Max	570.0	17.2	8.73	22	97	630	60	1100	650
Min	10.2	0.0	7.93	2	13	20	10 <	200	20
Mean	176.3	7.4	8.21	10	46	211	11	467	222

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 08.5 Clark Fork at Sager Lane Bridge

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	16.3	15.9	8.28	16	32	150	10 <	300	150
AUG	1	10.2	14.9	8.18	4	13	120	10 <	200	120
SEP	1	72.3	17.2	8.73	5	22	20	10 <	300	20
OCT	1	119.1	3.1	8.30	2	19	50	10 <	200	50
NOV	1	144.2	1.6	8.16	4	15	150	10	200	160
DEC	1	100.0	0.0	8.27	9	28	630	20	300	650
JAN	1	134.9	0.2	8.47	16	38	440	50	1100	490
FEB	1	127.6	1.4	8.04	14	56	470	60	200	530
MAR	1	158.0	2.2	8.29	6	46	300	10 <	400	300
APR	2	160.8	5.8	8.03	4	68	215	10 <	450	215
MAY	2	260.2	10.5	8.11	16	75	170	10	1000	180
JUN	2	460.0	10.9	8.10	18	70	35	10 <	450	35
N=	15	12	12	12	12	12	12	12	12	12
Max		460.0	17.2	8.73	18	75	630	60	1100	650
Min		10.2	0.0	8.03	2	13	20	10 <	200	20
Mean		147.0	7.0	8.25	9	40	229	13	425	242
Annual Nutrient Load (tons/year)					1.64	7.44	29.17	1.64	73.09	30.81

Frequency of Exceedence	
Phosphorus Criterion	29%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.8 X
Nitrogen Criterion	0.2 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.23
NITROGEN	0.00

CUMULATIVE SCORE	0.23

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:09 Clark Fork at Deer Lodge

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	41.0 (M)	16.5	8.30	5	23	100	10 <	200	100
Aug 07	30.0 (M)	16.8	8.21	6	19	120	10 <	200	120
Sep 11	123.0 (M)	16.7	8.41	3	18	40	10 <	300	40
Oct 17	168.0 (M)	3.0	8.05	3	22	120	10 <	500	120
Nov 15	179.0 (M)	2.5	8.15	1	18	210	10 <	300	210
Dec 19	140.0 (E)	0.0	8.00	12	25	830	20	200	850
Jan 16	190.0 (M)	0.3	8.23	24	44	550	40	400	590
Feb 13	176.0 (M)	1.4	8.05	13	57	560	60	100 <	620
Mar 14	191.0 (M)	3.1	8.00	9	57	340	10 <	600	340
Apr 09	195.0 (M)	3.5	8.06	5	72	360	10 <	600	360
Apr 24	191.0 (M)	10.0	8.11	6	60	180	10 <	400	180
May 15	236.0 (M)	11.0	8.14	12	75	250	10	900	260
May 30	345.0 (M)	10.7	7.95	18	71	140	10 <	1100	140
Jun 12	685.0 (M)	12.0	8.18	23	106	80	10 <	400	80
Jun 25	372.0 (M)	12.0	7.85	15	47	80	10 <	300	80
N=	15	15	15	15	15	15	15	15	15
Max	685.0	16.8	8.41	24	106	830	60	1100	850
Min	30.0	0.0	7.85	1	18	40	10 <	100 <	40
Mean	217.5	8.0	8.11	10	48	264	10 <	427	273

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 09 Clark Fork at Deer Lodge

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	84.1	16.5	8.30	5	23	100	10 <	200	100
AUG	1	84.3	16.8	8.21	6	19	120	10 <	200	120
SEP	1	113.0	16.7	8.41	3	18	40	10 <	300	40
OCT	1	152.0	3.0	8.05	3	22	120	10 <	500	120
NOV	1	192.0	2.5	8.15	1	18	210	10 <	300	210
DEC	1	152.0	0.0	8.00	12	25	830	20	200	850
JAN	1	164.0	0.3	8.23	24	44	550	40	400	590
FEB	1	192.0	1.4	8.05	13	57	560	60	100 <	620
MAR	1	185.0	3.1	8.00	9	57	340	10 <	600	340
APR	2	188.0	6.8	8.09	6	66	270	10 <	500	270
MAY	2	287.0	10.9	8.05	15	73	195	10 <	1000	200
JUN	2	475.0	12.0	8.02	19	77	80	10 <	350	80
N=	15	12	12	12	12	12	12	12	12	12
Max		475.0	16.8	8.41	24	77	830	60	1000	850
Min		84.1	0.0	8.00	1	18	40	10 <	100 <	40
Mean		189.0	7.5	8.13	10	42	285	10	379	295
Annual Nutrient Load (tons/year)					2.14	9.34	49.99	1.67	78.87	51.78

Frequency of Exceedence	
Phosphorus Criterion	38%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.8 X
Nitrogen Criterion	0.3 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.31
NITROGEN	0.00

CUMULATIVE SCORE	0.31

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE: Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:10 Clark Fork above Little Blackfoot River

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	74.9 (I)	14.0	7.95	68	89	30	10 <	400	30
Aug 07	47.9 (I)	13.4	8.17	47	61	10 <	10 <	300	10 <
Sep 11	145.0 (I)	18.1	8.52	12	32	10 <	10 <	200	10 <
Oct 17	218.2 (I)	2.7	8.12	6	41	70	10 <	600	70
Nov 15	223.7 (I)	1.8	7.94	6	43	200	10 <	400	200
Dec 20									
Jan 16	200.0 (E)	-0.2	7.81	32	61	500	80	600	580
Feb 13	200.0 (E)	0.0	7.80	29	125	540	110	200	650
Mar 14	216.2 (I)	1.6	7.60	12	60	320	10 <	600	320
Apr 09	220.0 (I)	2.5	8.24	6	84	280	10 <	600	280
Apr 24	185.1 (I)	9.2	8.18	1	83	120	10 <	600	120
May 15	253.4 (I)	9.1	7.98	8	76	200	10 <	800	200
May 30	372.9 (I)	10.1	7.94	30	107	140	10 <	1100	140
Jun 12	700.0 (E)	11.6	8.12	34	145	80	20	800	100
Jun 25	441.8 (I)	10.4	8.05	32	71	90	10 <	400	90
N=	14	14	14	14	14	14	14	14	14
Max	700.0	18.1	8.52	68	145	540	110	1100	650
Min	47.9	-0.2	7.60	1	32	10 <	10 <	200	10 <
Mean	249.9	7.5	8.03	23	77	184	15	543	199

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 10 Clark Fork above Little Blackfoot River

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	74.9	14.0	7.95	68	89	30	10 <	400	30
AUG	1	47.9	13.4	8.17	47	61	10 <	10 <	300	10 <
SEP	1	145.0	18.1	8.52	12	32	10 <	10 <	200	10 <
OCT	1	218.2	2.7	8.12	6	41	70	10 <	600	70
NOV	1	223.7	1.8	7.94	6	43	200	10 <	400	200
DEC	0									
JAN	1	200.0	-0.2	7.81	32	61	500	80	600	580
FEB	1	200.0	0.0	7.80	29	125	540	110	200	650
MAR	1	216.2	1.6	7.60	12	60	320	10 <	600	320
APR	2	202.6	5.9	8.21	4	84	200	10 <	600	200
MAY	2	313.2	9.6	7.96	19	92	170	10 <	950	170
JUN	2	570.9	11.0	8.09	33	108	85	10	600	95
N=	14	11	11	11	11	11	11	11	11	11
Max		570.9	18.1	8.52	68	125	540	110	950	650
Min		47.9	-0.2	7.60	4	32	10 <	10 <	200	10 <
Mean		219.3	7.1	8.02	24	72	192	18	495	210
Annual Nutrient Load (tons/year)					4.24	15.44	39.01	3.46	110.48	42.47

Frequency of Exceedence	
Phosphorus Criterion	73%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	1.4 X
Nitrogen Criterion	0.2 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	1.05
NITROGEN	0.00

CUMULATIVE SCORE	1.05

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE: Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:11 Clark Fork at Gold Creek Bridge

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	201.0 (M)	17.8	8.38	34	53	10 <	10 <	200	10 <
Aug 08	163.0 (M)	18.2	8.75	29	38	10 <	10 <	200	10 <
Sep 12	221.0 (M)	12.7	8.12	11	27	30	10 <	200	30
Oct 17	320.0 (M)	5.1	8.36	7	36	10 <	10 <	400	10 <
Nov 15	320.0 (M)	2.8	8.40	6	29	70	10 <	300	70
Dec 20	230.0 (E)								
Jan 16	300.0 (E)	0.1	7.65	32	55	380	60	400	440
Feb 13	290.0 (E)	1.3	8.06	22	73	390	60	100 <	450
Mar 14	304.0 (M)	4.1	8.30	12	46	190	10 <	400	190
Apr 09	367.0 (M)	4.3	8.38	4	57	90	10 <	400	90
Apr 24	394.0 (M)	10.7	8.38	1 <	60	10 <	10 <	500	10 <
May 15	594.0 (M)	12.3	8.53	12	94	20	10 <	900	20
May 30	911.0 (M)	11.1	7.85	23	69	120	10 <	1000	120
Jun 12	1450.0 (M)	13.3	8.36	28	91	50	10 <	700	50
Jun 25	817.0 (M)	12.5	8.10	24	51	30	10 <	300	30
N=	15	14	14	14	14	14	14	14	14
Max	1450.0	18.2	8.75	34	94	390	60	1000	450
Min	163.0	0.1	7.65	1 <	27	10 <	10 <	100 <	10 <
Mean	458.8	9.0	8.26	17	56	98	10 <	421	106

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Station: 11 Clark Fork at Gold Creek Bridge

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	271.0	17.8	8.38	34	53	10 <	10 <	200	10 <
AUG	1	208.0	18.2	8.75	29	38	10 <	10 <	200	10 <
SEP	1	215.0	12.7	8.12	11	27	30	10 <	200	30
OCT	1	286.0	5.1	8.36	7	36	10 <	10 <	400	10 <
NOV	1	332.0	2.8	8.40	6	29	70	10 <	300	70
DEC	0	268.0								
JAN	1	267.0	0.1	7.65	32	55	380	60	400	440
FEB	1	341.0	1.3	8.06	22	73	390	60	100 <	450
MAR	1	311.0	4.1	8.30	12	46	190	10 <	400	190
APR	2	362.0	7.5	8.38	2	59	45	10 <	450	45
MAY	2	778.0	11.7	8.19	18	82	70	10 <	950	70
JUN	2	1051.0	12.9	8.23	26	71	40	10 <	500	40
N=	14	12	11	11	11	11	11	11	11	11
Max		1051.0	18.2	8.75	34	82	390	60	950	450
Min		208.0	0.1	7.65	2	27	10 <	10 <	100 <	10 <
Mean		390.8	8.6	8.26	18	52	110	11	364	121
Annual Nutrient Load (tons/year)					6.79	21.31	35.11	2.88	165.81	38.00

Frequency of Exceedence	
Phosphorus Criterion	55%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	1.0 X
Nitrogen Criterion	0.1 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.56
NITROGEN	0.00

CUMULATIVE SCORE 0.56

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:12 Clark Fork at Bonita

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	406.0 (E)	17.6	8.47	16	38	10 <	10 <	300	10 <
Aug 05	278.0 (E)	19.0	8.53	9	19	10 <	10 <	400	10 <
Sep 10	447.0 (E)	15.2	8.42	16	34	10 <	10 <	300	10 <
Oct 15	548.0 (E)	5.4	8.30	14	38	20	10 <	500	20
Nov 12	640.0 (E)	4.6	8.45	12	39	40	10 <	100	40
Dec 18	380.0 (E)	0.2	8.41	8	32	240	10 <	300	240
Jan 15	535.0 (E)	2.8	8.33	26	55	300	10	400	310
Feb 11	524.0 (E)	0.8	8.37	17	39	270	10 <	200	270
Mar 12	556.0 (E)	2.7	8.36	9	36	60	10 <	300	60
Apr 09	617.0 (E)	6.2	8.43	9	59	10 <	10 <	400	10 <
Apr 24	568.0 (E)	12.0	8.60	4	62	10 <	10 <	300	10 <
May 14	602.0 (E)	9.3	8.43	10	83	10 <	10 <	200	10 <
May 28	1720.0 (E)	6.2	8.17	31	115	110	10 <	1000	110
Jun 11	1790.0 (E)	14.3	8.14	32	125	60	10 <	600	60
Jun 25	1350.0 (E)	13.3	8.45	29	55	10 <	10 <	400	10 <
N=	15	15	15	15	15	15	15	15	15
Max	1790.0	19.0	8.60	32	125	300	10	1000	310
Min	278.0	0.2	8.14	4	19	10 <	10 <	100	10 <
Mean	730.7	8.6	8.39	16	55	73	10 <	380	74

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Station: 12 Clark Fork at Bonita

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	465.0	17.6	8.47	16	38	10 <	10 <	300	10 <
AUG	1	367.0	19.0	8.53	9	19	10 <	10 <	400	10 <
SEP	1	398.0	15.2	8.42	16	34	10 <	10 <	300	10 <
OCT	1	533.0	5.4	8.30	14	38	20	10 <	500	20
NOV	1	606.0	4.6	8.45	12	39	40	10 <	100	40
DEC	1	450.0	0.2	8.41	8	32	240	10 <	300	240
JAN	1	459.0	2.8	8.33	26	55	300	10	400	310
FEB	1	591.0	0.8	8.37	17	39	270	10 <	200	270
MAR	1	549.0	2.7	8.36	9	36	60	10 <	300	60
APR	2	576.0	9.1	8.52	7	61	10 <	10 <	350	10 <
MAY	2	1042.0	7.8	8.30	21	99	55	10 <	600	55
JUN	2	1425.0	13.8	8.30	31	90	30	10 <	500	30
N=	15	12	12	12	12	12	12	12	12	12
Max		1425.0	19.0	8.53	31	99	300	10	600	310
Min		367.0	0.2	8.30	7	19	10 <	10 <	100	10 <
Mean		621.8	8.2	8.40	15	48	85	10 <	354	85
Annual Nutrient Load (tons/year)					10.69	35.26	46.41	0.38	236.17	46.80

Frequency of Exceedence	
Phosphorus Criterion	33%
Nitrogen Criterion	0%

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	1.0 X
Nitrogen Criterion	0.1 X

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.32
NITROGEN	0.00

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

CUMULATIVE SCORE	0.32

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:13 Clark Fork at Turah

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	892.0 (M)	16.5	8.54	6	19	10 <	10 <	400	10 <
Aug 05	578.0 (M)	18.4	8.65	6	19	30	10 <	500	30
Sep 10	674.0 (M)	15.2	8.50	7	20	10 <	10 <	200	10 <
Oct 15	772.0 (M)	5.3	8.31	9	24	20	10 <	200	20
Nov 12	859.0 (M)	4.4	8.48	9	27	50	10 <	100	50
Dec 18	500.0 (E)	0.3	8.40	6	20	140	10 <	300	140
Jan 15	704.0 (M)	1.8	8.34	19	46	230	10 <	400	230
Feb 11	669.0 (M)	1.7	8.46	9	26	140	10 <	100 <	140
Mar 12	713.0 (M)	2.5	8.47	6	26	30	10 <	100	30
Apr 09	875.0 (M)	6.3	8.46	6	49	10	10 <	300	10
Apr 24	867.0 (M)	11.0	8.64	3	51	10	10 <	300	10
May 14	1170.0 (M)	8.1	8.33	8	64	10	10 <	400	10
May 28	3300.0 (M)	5.0	8.06	19	61	60	10 <	400	60
Jun 11	4090.0 (M)	12.2	8.09	22	73	30	10 <	600	30
Jun 25	2550.0 (M)	12.2	8.43	17	35	10 <	10 <	200	10 <
N=	15	15	15	15	15	15	15	15	15
Max	4090.0	18.4	8.65	22	73	230	10 <	600	230
Min	500.0	0.3	8.06	3	19	10 <	10 <	100 <	10 <
Mean	1280.9	8.1	8.41	10	37	51	10 <	293	51

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 13 Clark Fork at Turah

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	1007.0	16.5	8.54	6	19	10 <	10 <	400	10 <
AUG	1	654.0	18.4	8.65	6	19	30	10 <	500	30
SEP	1	612.0	15.2	8.50	7	20	10 <	10 <	200	10 <
OCT	1	751.0	5.3	8.31	9	24	20	10 <	200	20
NOV	1	812.0	4.4	8.48	9	27	50	10 <	100	50
DEC	1	588.0	0.3	8.40	6	20	140	10 <	300	140
JAN	1	605.0	1.8	8.34	19	46	230	10 <	400	230
FEB	1	759.0	1.7	8.46	9	26	140	10 <	100 <	140
MAR	1	712.0	2.5	8.47	6	26	30	10 <	100	30
APR	2	828.0	8.7	8.55	5	50	10	10 <	300	10
MAY	2	2043.0	6.6	8.20	14	63	35	10 <	400	35
JUN	2	3114.0	12.2	8.26	20	54	15	10 <	400	15
N=	15	12	12	12	12	12	12	12	12	12
Max		3114.0	18.4	8.65	20	63	230	10 <	500	230
Min		588.0	0.3	8.20	5	19	10 <	10 <	100 <	10 <
Mean		1040.4	7.8	8.43	10	33	58	10 <	275	58
Annual Nutrient Load (tons/year)					11.98	40.86	44.90	0.00	319.95	44.90

Frequency of Exceedence	
Phosphorus Criterion	17%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.7 X
Nitrogen Criterion	0.1 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.11
NITROGEN	0.00

CUMULATIVE SCORE	0.11

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:15.5 Clark Fork above Missoula

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	2280.0 (M)	18.8	8.49	6	18	10 <	10 <	100	10 <
Aug 05	1520.0 (M)	19.3	8.50	6	20	10 <	10 <	300	10 <
Sep 10	1320.0 (M)	18.2	8.56	4	15	10 <	10 <	200	10 <
Oct 15	1420.0 (M)	5.7	8.39	5	13	10	10 <	200	10
Nov 12	1660.0 (M)	4.3	8.49	5	16	20	10 <	100 <	20
Dec 18	1000.0 (E)	0.1	8.46	3	10	50	10 <	100	50
Jan 15	1450.0 (E)	0.0	8.34	11	24	160	10 <	200	160
Feb 11	1180.0 (M)	0.6	8.54	4	13	50	10 <	100 <	50
Mar 12	1470.0 (M)	2.5	8.74	6	19	10 <	10 <	200	10 <
Apr 09	2640.0 (M)	4.9	8.33	5	28	10 <	10 <	300	10 <
Apr 24	3230.0 (M)	6.9	8.33	5	34	10 <	10 <	200	10 <
May 14	6030.0 (M)	6.7	8.28	5	62	80	10 <	400	80
May 28	9700.0 (M)	5.7	7.97	9	51	80	10 <	500	80
Jun 11	10400.0 (M)	11.9	8.16	11	59	30	10 <	400	30
Jun 25	7100.0 (M)	11.5	8.36	9	28	10	10 <	400	10
N=	15	15	15	15	15	15	15	15	15
Max	10400.0	19.3	8.74	11	62	160	10 <	500	160
Min	1000.0	0.0	7.97	3	10	10 <	10 <	100 <	10 <
Mean	3493.3	7.8	8.40	6	27	33	10 <	233	33

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 15.5 Clark Fork above Missoula

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	2795.0	18.8	8.49	6	18	10 <	10 <	100	10 <
AUG	1	1509.0	19.3	8.50	6	20	10 <	10 <	300	10 <
SEP	1	1235.0	18.2	8.56	4	15	10 <	10 <	200	10 <
OCT	1	1369.0	5.7	8.39	5	13	10	10 <	200	10
NOV	1	1563.0	4.3	8.49	5	16	20	10 <	100 <	20
DEC	1	1131.0	0.1	8.46	3	10	50	10 <	100	50
JAN	1	1175.0	0.0	8.34	11	24	160	10 <	200	160
FEB	1	1411.0	0.6	8.54	4	13	50	10 <	100 <	50
MAR	1	1487.0	2.5	8.74	6	19	10 <	10 <	200	10 <
APR	2	2613.0	5.9	8.33	5	31	10 <	10 <	250	10 <
MAY	2	7259.0	6.2	8.13	7	57	80	10 <	450	80
JUN	2	8453.0	11.7	8.26	10	44	20	10 <	400	20
N=	15	12	12	12	12	12	12	12	12	12
Max		8453.0	19.3	8.74	11	57	160	10 <	450	160
Min		1131.0	0.0	8.13	3	10	10 <	10 <	100 <	10 <
Mean		2666.7	7.8	8.44	6	23	33	10 <	200	33
Annual Nutrient Load (tons/year)					18.43	89.32	91.61	0.00	757.03	91.61

Frequency of Exceedence	
Phosphorus Criterion	13%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.5 X
Nitrogen Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.06
NITROGEN	0.00

CUMULATIVE SCORE 0.06

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN
Monitoring Station:18 Clark Fork at Shuffield's

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	2280.0 (E)	19.2	8.55	15	31	50	10 <	400	50
Aug 06	1410.0 (E)	18.2	8.44	12	26	40	10 <	300	40
Sep 10	1320.0 (E)	18.4	8.65	25	38	90	10 <	300	90
Oct 15	1420.0 (E)	6.5	8.45	20	33	90	40	500	130
Nov 12	1660.0 (E)	4.9	8.52	25	37	30	50	100 <	80
Dec 18	1000.0 (E)	0.0	8.47	20	34	60	130	300	190
Jan 15	1450.0 (E)	0.8	8.35	33	46	160	120	400	280
Feb 11	1180.0 (E)	1.4	8.57	25	36	50	100	200	150
Mar 12	1470.0 (E)	3.2	8.83	22	37	10	80	400	90
Apr 09	2640.0 (E)	5.3	8.38	15	36	10 <	50	700	50
Apr 24	3230.0 (E)	6.9	8.32	16	46	10 <	70	400	70
May 14	6030.0 (E)	6.9	8.32	9	63	90	20	300	110
May 28	9700.0 (E)	6.1	8.20	12	52	110	10 <	500	110
Jun 11	10400.0 (E)	11.5	8.22	14	53	70	10 <	600	70
Jun 25	7100.0 (E)	11.6	8.35	13	31	50	10	400	60
N=	15	15	15	15	15	15	15	15	15
Max	10400.0	19.2	8.83	33	63	160	130	700	280
Min	1000.0	0.0	8.20	9	26	10 <	10 <	100 <	40
Mean	3486.0	8.1	8.44	18	40	60	45	380	105

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN
Station: 18 Clark Fork at Shuffield's

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	2795.0	19.2	8.55	15	31	50	10 <	400	50
AUG	1	1509.0	18.2	8.44	12	26	40	10 <	300	40
SEP	1	1235.0	18.4	8.65	25	38	90	10 <	300	90
OCT	1	1369.0	6.5	8.45	20	33	90	40	500	130
NOV	1	1563.0	4.9	8.52	25	37	30	50	100 <	80
DEC	1	1131.0	0.0	8.47	20	34	60	130	300	190
JAN	1	1175.0	0.8	8.35	33	46	160	120	400	280
FEB	1	1411.0	1.4	8.57	25	36	50	100	200	150
MAR	1	1487.0	3.2	8.83	22	37	10	80	400	90
APR	2	2613.0	6.1	8.35	16	41	10 <	60	550	60
MAY	2	7259.0	6.5	8.26	11	58	100	10	400	110
JUN	2	8453.0	11.6	8.29	14	42	60	10 <	500	65
N=	15	12	12	12	12	12	12	12	12	12
Max		8453.0	19.2	8.83	33	58	160	130	550	280
Min		1131.0	0.0	8.26	11	26	10 <	10 <	100 <	40
Mean		2666.7	8.1	8.48	20	38	62	49	354	111
Annual Nutrient Load (tons/year)					42.35	111.16	169.38	74.28	1057.45	247.08

Frequency of Exceedence	
Phosphorus Criterion	13%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	0.8 X
Nitrogen Criterion	0.1 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.10
NITROGEN	0.00
CUMULATIVE SCORE	0.10

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%
Magnitude of Exceedence	
Chronic Ammonia Criterion	0.1 X
Acute Ammonia Criterion	0.0 X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:20 Clark Fork at Harper Bridge

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	3860.0 (M)	20.2	8.75	6	19	20	10 <	200	20
Aug 06	2380.0 (M)	17.4	8.29	6	20	50	10 <	200	50
Sep 10	2170.0 (M)	18.1	8.82	5	19	20	10 <	200	20
Oct 15	2360.0 (M)	7.7	8.61	6	17	50	10 <	500	50
Nov 12	2880.0 (M)	5.6	8.78	7	19	40	10 <	100 <	40
Dec 18	1650.0 (E)	0.8	8.45	6	21	120	20	200	140
Jan 15	2400.0 (M)	1.8	8.27	27	44	210	50	400	260
Feb 11	1940.0 (M)	2.5	8.55	9	22	120	10 <	100 <	120
Mar 12	2480.0 (M)	3.6	8.65	8	27	70	10 <	300	70
Apr 10	4440.0 (M)	4.6	8.22	10	32	60	10	300	70
Apr 24	4990.0 (M)	7.5	8.30	4	41	20	10 <	400	20
May 14	9580.0 (M)	7.8	8.15	7	51	100	10	200	110
May 28	17000.0 (M)	6.5	8.18	10	44	80	10 <	300	80
Jun 11	21600.0 (M)	12.6	8.07	11	38	30	10 <	500	30
Jun 26	13100.0 (M)	11.0	8.07	9	24	30	10 <	300	30
N=	15	15	15	15	15	15	15	15	15
Max	21600.0	20.2	8.82	27	51	210	50	500	260
Min	1650.0	0.8	8.07	4	17	20	10 <	100 <	20
Mean	6188.7	8.5	8.41	9	29	68	10 <	267	74

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 20 Clark Fork at Harper Bridge

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	5173.0	20.2	8.75	6	19	20	10 <	200	20
AUG	1	2554.0	17.4	8.29	6	20	50	10 <	200	50
SEP	1	2017.0	18.1	8.82	5	19	20	10 <	200	20
OCT	1	2380.0	7.7	8.61	6	17	50	10 <	500	50
NOV	1	2714.0	5.6	8.78	7	19	40	10 <	100 <	40
DEC	1	1857.0	0.8	8.45	6	21	120	20	200	140
JAN	1	1918.0	1.8	8.27	27	44	210	50	400	260
FEB	1	2312.0	2.5	8.55	9	22	120	10 <	100 <	120
MAR	1	2461.0	3.6	8.65	8	27	70	10 <	300	70
APR	2	4250.0	6.1	8.26	7	37	40	10 <	350	45
MAY	2	12400.0	7.2	8.17	9	48	90	10 <	250	95
JUN	2	16940.0	11.8	8.07	10	31	30	10 <	400	30
N=	15	12	12	12	12	12	12	12	12	12
Max		16940.0	20.2	8.82	27	48	210	50	500	260
Min		1857.0	0.8	8.07	5	17	20	10 <	100 <	20
Mean		4748.0	8.6	8.47	9	27	72	10 <	250	78
Annual Nutrient Load (tons/year)					40.80	147.03	276.96	11.11	1345.04	294.97

Frequency of Exceedence	
Phosphorus Criterion	4%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.5 X
Nitrogen Criterion	0.1 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.02
NITROGEN	0.00

CUMULATIVE SCORE	0.02

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:22 Clark Fork at Huson

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	3860.0 (E)	20.8	8.67	6	19	10 <	10 <	400	10 <
Aug 06	2380.0 (E)	19.7	8.50	5	19	10	10 <	300	10
Sep 10	2170.0 (E)	19.0	8.77	7	23	10 <	10 <	200	10 <
Oct 15	2360.0 (E)	7.3	8.45	10	23	50	10 <	200	50
Nov 13	2850.0 (E)	4.2	8.24	12	25	40	10 <		40
Dec 18	1650.0 (E)	0.7	8.44	7	25	120	10	200	130
Jan 15	2400.0 (E)	0.6	8.20	38	89	200	90	400	290
Feb 11	1940.0 (E)	2.5	8.51	12	26	110	10 <	100	110
Mar 12	2480.0 (E)	2.5	8.60	11	30	60	10 <	400	60
Apr 10	4440.0 (E)	4.8	8.20	9	34	50	10 <	400	50
Apr 24	4990.0 (E)	7.6	8.31	4	23	20	10 <	300	20
May 14	9580.0 (E)	7.8	8.26	7	75	90	20	500	110
May 28	17000.0 (E)	7.7	8.24	11	48	70	30	400	100
Jun 11	21600.0 (E)	12.8	8.04	12	45	20	20	300	40
Jun 26	13100.0 (E)	11.8	8.12	10	28	20	10 <	300	20
N=	15	15	15	15	15	15	15	14	15
Max	21600.0	20.8	8.77	38	89	200	90	500	290
Min	1650.0	0.6	8.04	4	19	10 <	10 <	100	10 <
Mean	6186.7	8.7	8.37	11	35	57	11	314	69

NOTE:Estimated streamflows are denoted with an (E) following the value.

Instantaneous streamflows (gaged) are denoted with an (I) following the value.

Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 22 Clark Fork at Huson

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	5173.0	20.8	8.67	6	19	10 <	10 <	400	10 <
AUG	1	2554.0	19.7	8.50	5	19	10	10 <	300	10
SEP	1	2017.0	19.0	8.77	7	23	10 <	10 <	200	10 <
OCT	1	2380.0	7.3	8.45	10	23	50	10 <	200	50
NOV	1	2714.0	4.2	8.24	12	25	40	10 <		40
DEC	1	1857.0	0.7	8.44	7	25	120	10	200	130
JAN	1	1918.0	0.6	8.20	38	89	200	90	400	290
FEB	1	2312.0	2.5	8.51	12	26	110	10 <	100	110
MAR	1	2461.0	2.5	8.60	11	30	60	10 <	400	60
APR	2	4250.0	6.2	8.26	7	29	35	10 <	350	35
MAY	2	12400.0	7.8	8.25	9	62	80	25	450	105
JUN	2	16940.0	12.3	8.08	11	37	20	10	300	30
N=	15	12	12	12	12	12	12	12	11	12
Max		16940.0	20.8	8.77	38	89	200	90	450	290
Min		1857.0	0.6	8.08	5	19	10 <	10 <	100	10 <
Mean		4748.0	8.6	8.41	11	34	60	11	300	72
Annual Nutrient Load (tons/year)					47.58	178.41	225.34	55.57	1501.40	280.91

Frequency of Exceedence	
Phosphorus Criterion	13%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.7 X
Nitrogen Criterion	0.1 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.08
NITROGEN	0.00

CUMULATIVE SCORE	0.08

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:23 Clark Fork near Alberton

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	3860.0 (E)	20.2	8.54	5	18	10 <	10 <	400	10 <
Aug 06	2380.0 (E)	20.9	8.53	6	18	10	10 <	300	10
Sep 10	2170.0 (E)	18.8	8.60	7	21	10 <	10 <	300	10 <
Oct 16	2430.0 (E)	7.1	8.39	6	25	30	10 <	500	30
Nov 13	2850.0 (E)	4.5	8.33	10	23	20	10 <	400	20
Dec 19	1100.0 (E)	0.0	8.62	7	26	110	20	200	130
Jan 16	2310.0 (E)	0.8	8.24	30	63	200	70	500	270
Feb 12	1950.0 (E)	1.8	8.38	8	24	110	20	100 <	130
Mar 12	2480.0 (E)	2.0	8.62	10	26	40	10 <	400	40
Apr 10	4440.0 (E)	5.1	8.25	9	37	10 <	10 <	400	10 <
Apr 24	4990.0 (E)	7.6	8.30	4	21	40	10 <	300	40
May 15	10600.0 (E)	6.8	8.19	9	65	100	20	700	120
May 28	17000.0 (E)	8.0	8.22	11	46	90	10 <	500	90
Jun 11	21600.0 (E)	12.8	7.97	11	43	30	10 <	400	30
Jun 26	13100.0 (E)	11.8	8.13	10	25	20	10 <	300	20
N=	15	15	15	15	15	15	15	15	15
Max	21600.0	20.9	8.62	30	65	200	70	700	270
Min	1100.0	0.0	7.97	4	18	10 <	10 <	100 <	10 <
Mean	6217.3	8.5	8.35	10	32	53	10 <	373	62

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 23 Clark Fork near Alberton

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	5173.0	20.2	8.54	5	18	10 <	10 <	400	10 <
AUG	1	2554.0	20.9	8.53	6	18	10	10 <	300	10
SEP	1	2017.0	18.8	8.60	7	21	10 <	10 <	300	10 <
OCT	1	2380.0	7.1	8.39	6	25	30	10 <	500	30
NOV	1	2714.0	4.5	8.33	10	23	20	10 <	400	20
DEC	1	1857.0	0.0	8.62	7	26	110	20	200	130
JAN	1	1918.0	0.8	8.24	30	63	200	70	500	270
FEB	1	2312.0	1.8	8.38	8	24	110	20	100 <	130
MAR	1	2461.0	2.0	8.62	10	26	40	10 <	400	40
APR	2	4250.0	6.4	8.28	7	29	20	10 <	350	20
MAY	2	12400.0	7.4	8.21	10	56	95	10	600	105
JUN	2	16940.0	12.3	8.05	11	34	25	10 <	350	25
N=	15	12	12	12	12	12	12	12	12	12
Max		16940.0	20.9	8.62	30	63	200	70	600	270
Min		1857.0	0.0	8.05	5	18	10 <	10 <	100 <	10 <
Mean		4748.0	8.5	8.40	10	30	55	10	358	65
Annual Nutrient Load (tons/year)					44.29	162.75	228.54	28.17	1887.58	256.71

Frequency of Exceedence	
Phosphorus Criterion	13%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	0.6 X
Nitrogen Criterion	0.1 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.08
NITROGEN	0.00
CUMULATIVE SCORE	0.08

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%
Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN
Monitoring Station:24 Clark Fork at Superior

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	3660.0 (E)	19.5	8.53	3	13	10 <	10 <	100	10 <
Aug 06	2380.0 (E)	20.5	8.70	5	16	10 <	10 <	200	10 <
Sep 10	2170.0 (E)	18.4	8.67	5	20	10 <	10 <	200	10 <
Oct 16	2430.0 (E)	7.4	8.61	4	20	10 <	10 <	300	10 <
Nov 13	2850.0 (E)	5.4	8.65	7	18	10 <	10 <		10 <
Dec 19	1100.0 (E)	0.0	8.50	5	22	70	10 <	100	70
Jan 16	2310.0 (E)	0.8	8.23	36	48	200	70	500	270
Feb 12	1950.0 (E)	2.3	8.45	6	18	70	10 <	100 <	70
Mar 13	2450.0 (E)	2.0	8.61	6	22	10	10 <	300	10
Apr 10	4440.0 (E)	6.2	8.34	7	35	50	10 <	400	50
Apr 24	4990.0 (E)	7.4	8.57	3	17	20	10 <	200	20
May 15	10600.0 (E)	6.9	8.24	8	54	80	10	700	90
May 29	15300.0 (E)	7.5	8.25	8	42	80	10 <	800	80
Jun 12	22300.0 (E)	10.7	8.00	11	50	30	10 <	400	30
Jun 26	13100.0 (E)	11.2	8.15	9	25	40	10 <	300	40
N=	15	15	15	15	15	15	15	14	15
Max	22300.0	20.5	8.70	36	54	200	70	800	270
Min	1100.0	0.0	8.00	3	13	10 <	10 <	100 <	10 <
Mean	6135.3	8.4	8.43	8	28	43	10 <	321	49

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 24 Clark Fork at Superior

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	5173.0	19.5	8.53	3	13	10 <	10 <	100	10 <
AUG	1	2554.0	20.5	8.70	5	16	10 <	10 <	200	10 <
SEP	1	2017.0	18.4	8.67	5	20	10 <	10 <	200	10 <
OCT	1	2380.0	7.4	8.61	4	20	10 <	10 <	300	10 <
NOV	1	2714.0	5.4	8.65	7	18	10 <	10 <		10 <
DEC	1	1857.0	0.0	8.50	5	22	70	10 <	100	70
JAN	1	1918.0	0.8	8.23	36	48	200	70	500	270
FEB	1	2312.0	2.3	8.45	6	18	70	10 <	100 <	70
MAR	1	2461.0	2.0	8.61	6	22	10	10 <	300	10
APR	2	4250.0	6.8	8.46	5	26	35	10 <	300	35
MAY	2	12400.0	7.2	8.25	8	48	80	10 <	750	85
JUN	2	16940.0	11.0	8.08	10	38	35	10 <	350	35
N=	15	12	12	12	12	12	12	12	11	12
Max		16940.0	20.5	8.70	36	48	200	70	750	270
Min		1857.0	0.0	8.08	3	13	10 <	10 <	100 <	10 <
Mean		4748.0	8.4	8.48	8	26	42	10 <	282	48
Annual Nutrient Load (tons/year)					38.04	149.01	200.02	11.22	1694.89	216.41

Frequency of Exceedence	
Phosphorus Criterion	4%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.5 X
Nitrogen Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.02
NITROGEN	0.00

CUMULATIVE SCORE	0.02

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:25 Clark Fork above Flathead River

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	4850.0 (M)	19.5	8.44	3	14	10	10 <	200	10
Aug 07	3080.0 (M)	20.7	8.56	6	16	10	10 <	100	10
Sep 11	2810.0 (M)	16.3	8.53	3	22	40	10 <	100	40
Oct 16	3130.0 (M)	7.8	8.53	2	17	10 <	10 <	400	10 <
Nov 13	3780.0 (M)	5.5	8.45	4	12	10 <	10 <		10 <
Dec 19	2870.0 (M)	0.0	8.37	3	10	80	10 <	100	80
Jan 16	3590.0 (M)	1.1	8.23	11	29	220	20	200	240
Feb 12	2790.0 (M)	3.0	8.50	5	15	60	10 <	100 <	60
Mar 13	3740.0 (M)	2.7	8.65	8	19	10 <	10 <	400	10 <
Apr 11	6570.0 (M)	5.3	8.26	8	34	50	10 <	400	50
Apr 24	8100.0 (M)	6.6	8.33	3	33	20	10 <	300	20
May 15	14800.0 (M)	7.6	8.18	6	49	70	110	500	180
May 29	22000.0 (M)	8.0	8.21	8	38	70	10 <	800	70
Jun 12	29100.0 (M)	11.5	7.96	12	48	20	10 <	400	20
Jun 26	17700.0 (M)	12.1	8.15	9	23	40	10 <	300	40
N=	15	15	15	15	15	15	15	14	15
Max	29100.0	20.7	8.65	12	49	220	110	800	240
Min	2790.0	0.0	7.96	2	10	10 <	10 <	100 <	10 <
Mean	8594.0	8.5	8.36	6	25	46	10 <	300	55

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 25 Clark Fork above Flathead River

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	6684.0	19.5	8.44	3	14	10	10 <	200	10
AUG	1	3284.0	20.7	8.56	6	16	10	10 <	100	10
SEP	1	2653.0	16.3	8.53	3	22	40	10 <	100	40
OCT	1	2975.0	7.8	8.53	2	17	10 <	10 <	400	10 <
NOV	1	3905.0	5.5	8.45	4	12	10 <	10 <		10 <
DEC	1	2766.0	0.0	8.37	3	10	80	10 <	100	80
JAN	1	2810.0	1.1	8.23	11	29	220	20	200	240
FEB	1	3400.0	3.0	8.50	5	15	60	10 <	100 <	60
MAR	1	3706.0	2.7	8.65	8	19	10 <	10 <	400	10 <
APR	2	6601.0	6.0	8.30	6	34	35	10 <	350	35
MAY	2	17960.0	7.8	8.20	7	44	70	55	650	125
JUN	2	22210.0	11.8	8.06	11	36	30	10 <	350	30
N=	15	12	12	12	12	12	12	12	11	12
Max		22210.0	20.7	8.65	11	44	220	55	650	240
Min		2653.0	0.0	8.06	2	10	10 <	10 <	100 <	10 <
Mean		6579.5	8.5	8.40	6	22	46	10 <	259	53
Annual Nutrient Load (tons/year)					45.05	190.69	280.02	87.22	2244.48	367.24

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.4 X
Nitrogen Criterion	0.1 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00

CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:27 Clark Fork above Thompson Falls Reservoir

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	17500.0 (M)	21.6	8.55	1	7	10 <	10 <	100	10 <
Aug 08	14200.0 (M)	22.7	8.63	1	7	10 <	10 <	100 <	10 <
Sep 11	10800.0 (M)	18.8	8.55	1	9	10 <	10 <	100 <	10 <
Oct 16	15900.0 (M)	8.6	8.42	1 <	7	10	10 <	200	10
Nov 13	16300.0 (M)	5.8	8.42	1	6	30	10 <	200	30
Dec 19	15900.0 (M)	0.0	8.25	1	5	50	10 <	100	50
Jan 16	18200.0 (M)	1.1	8.28	4	22	90	10 <	200	90
Feb 12	19100.0 (M)	2.8	8.46	1	7	40	10 <	100 <	40
Mar 13	17600.0 (M)	1.2	8.50	1	8	20	10 <	200	20
Apr 10	20900.0 (M)	5.8	8.51	2	19	50	10 <	300	50
Apr 24	23300.0 (M)	6.5	8.47	1 <	16	30	10 <	100	30
May 15	28700.0 (M)	7.4	8.33	2	25	30	10 <	500	30
May 29	65100.0 (M)	8.6	8.35	2	23	50	10 <	600	50
Jun 12	69800.0 (M)	12.1	8.16	4	28	10 <	10 <	400	10 <
Jun 26	56700.0 (M)	13.2	8.25	2	22	20	10 <	200	20
N=	15	15	15	15	15	15	15	15	15
Max	69800.0	22.7	8.63	4	28	90	10 <	600	90
Min	10800.0	0.0	8.16	1 <	5	10 <	10 <	100 <	10 <
Mean	27333.3	9.1	8.41	2	14	28	10 <	207	28

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 27 Clark Fork above Thompson Falls Reservoir

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	25470.0	21.6	8.55	1	7	10 <	10 <	100	10 <
AUG	1	10510.0	22.7	8.63	1	7	10 <	10 <	100 <	10 <
SEP	1	11170.0	18.8	8.55	1	9	10 <	10 <	100 <	10 <
OCT	1	14600.0	8.6	8.42	1 <	7	10	10 <	200	10
NOV	1	16010.0	5.8	8.42	1	6	30	10 <	200	30
DEC	1	15190.0	0.0	8.25	1	5	50	10 <	100	50
JAN	1	16710.0	1.1	8.28	4	22	90	10 <	200	90
FEB	1	19400.0	2.8	8.46	1	7	40	10 <	100 <	40
MAR	1	17030.0	1.2	8.50	1	8	20	10 <	200	20
APR	2	21570.0	6.2	8.49	1	18	40	10 <	200	40
MAY	2	44790.0	8.0	8.34	2	24	40	10 <	550	40
JUN	2	55280.0	12.7	8.21	3	25	10	10 <	300	10
N=	15	12	12	12	12	12	12	12	12	12
Max		55280.0	22.7	8.63	4	25	90	10 <	550	90
Min		10510.0	0.0	8.21	1 <	5	10 <	10 <	100 <	10 <
Mean		22310.8	9.1	8.42	1	12	28	10 <	171	28
Annual Nutrient Load (tons/year)					37.58	336.22	591.27	0.00	5153.98	591.27

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	0.2 X
Nitrogen Criterion	0.0 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00
CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%
Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:28 Clark Fork below Thompson Falls Dam

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	16434.0 (M)	20.4	8.40	1 <	6	10 <	10 <	100 <	10 <
Aug 08	16317.0 (M)	21.3	8.41	2	9	10 <	10 <	200	10 <
Sep 11	11864.0 (M)	19.8	8.62	1 <	10	10 <	10 <	200	10 <
Oct 16	16288.0 (M)	8.3	8.34	1 <	7	10	10 <	100	10
Nov 13	17259.0 (M)	5.5	8.32	1	5	10	10 <	200	10
Dec 19	16461.0 (M)	0.0	8.21	1	5	50	10 <	100	50
Jan 16	19865.0 (M)	0.8	8.27	3	16	90	20	100 <	110
Feb 12	20427.0 (M)	2.4	8.37	1	8	60	10 <	100 <	60
Mar 13	18091.0 (M)	0.8	8.35	1	9	20	10 <	200	20
Apr 11	21738.0 (M)	5.1	8.44	2	14	30	10 <	200	30
Apr 24	24630.0 (M)	6.1	8.38	1 <	15	50	10 <	200	50
May 15	32280.0 (M)	7.5	8.27	2	22	30	10 <	500	30
May 29	68171.0 (M)	8.7	8.37	2	25	40	10 <	700	40
Jun 12	70930.0 (M)	12.0	8.16	4	32	10 <	10 <	400	10 <
Jun 27	55016.0 (M)	12.8	8.26	2	23	20	10 <	200	20
N=	15	15	15	15	15	15	15	15	15
Max	70930.0	21.3	8.62	4	32	90	20	700	110
Min	11864.0	0.0	8.16	1 <	5	10 <	10 <	100 <	10 <
Mean	28384.7	8.8	8.34	1	14	27	10 <	213	29

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 28 Clark Fork below Thompson Falls Dam

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	26501.0	20.4	8.40	1 <	6	10 <	10 <	100 <	10 <
AUG	1	11419.0	21.3	8.41	2	9	10 <	10 <	200	10 <
SEP	1	11928.0	19.8	8.62	1 <	10	10 <	10 <	200	10 <
OCT	1	15060.0	8.3	8.34	1 <	7	10	10 <	100	10
NOV	1	16806.0	5.5	8.32	1	5	10	10 <	200	10
DEC	1	15381.0	0.0	8.21	1	5	50	10 <	100	50
JAN	1	16859.0	0.8	8.27	3	16	90	20	100 <	110
FEB	1	19834.0	2.4	8.37	1	8	60	10 <	100 <	60
MAR	1	17564.0	0.8	8.35	1	9	20	10 <	200	20
APR	2	22083.0	5.6	8.41	1	15	40	10 <	200	40
MAY	2	45149.0	8.1	8.32	2	24	35	10 <	600	35
JUN	2	57773.0	12.4	8.21	3	28	10	10 <	300	10
N=	15	12	12	12	12	12	12	12	12	12
Max		57773.0	21.3	8.62	3	28	90	20	600	110
Min		11419.0	0.0	8.21	1 <	5	10 <	10 <	100 <	10 <
Mean		23029.8	8.8	8.35	1	12	27	10 <	175	29
Annual Nutrient Load (tons/year)					35.08	344.24	586.48	28.17	5224.78	614.65

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.2 X
Nitrogen Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00

CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:29 Clark Fork at Noxon Bridge

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 19	17400.0 (M)	19.3	8.34	1	9	10	10 <	100	10
Aug 08	16600.0 (M)	20.3	8.24	4	9	10	20	100	30
Sep 11	10500.0 (M)	19.5	8.30	3	11	20	10 <	100	20
Oct 17	17300.0 (M)	11.7	8.22	1	9	30	10 <	100 <	30
Nov 14	16700.0 (M)	7.7	8.26	3	5	30	10 <	100	30
Dec 20	20100.0 (M)	1.4	8.27	1	6	50	10 <	100 <	50
Jan 17	20900.0 (M)	1.1	8.29	1	6	70	10 <	100	70
Feb 13	19200.0 (M)	1.6	8.33	1	6	70	10 <	100	70
Mar 14	20700.0 (M)	0.2	8.16	1	7	30	10 <	200	30
Apr 11	20900.0 (M)	5.7	8.45	1	9	20	10 <	100 <	20
Apr 25	31100.0 (M)	5.0	8.38	1 <	9	20	10 <	100	20
May 16	35000.0 (M)	6.4	8.30	1	8	10 <	10 <	300	10 <
May 29	69700.0 (M)	8.3	8.28	1	15	40	10 <	600	40
Jun 12	74300.0 (M)	11.7	8.10	4	16	30	10 <	400	30
Jun 27	55400.0 (M)	13.2	8.18	4	12	30	10 <	200	30
N=	15	15	15	15	15	15	15	15	15
Max	74300.0	20.3	8.45	4	16	70	20	600	70
Min	10500.0	0.2	8.10	1 <	5	10 <	10 <	100 <	10 <
Mean	29720.0	8.9	8.27	2	9	31	1	160	32

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

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CLARK FORK BASIN MONITORING - FY 1991                        MONTANA WATER QUALITY BUREAU                                  GARY INGMAN
Station:  29  Clark Fork at Noxon Bridge
                                                     Monthly Average Values
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          Stream-   Water          Diss.Ortho P      Total P      Diss.NO3+NO2    Diss.NH3+NH4     Total KJL-N        TSIN
           flow     Temp.          (SRP) Conc.        Conc.          Conc.           Conc.           Conc.           Conc.
Month  N=  (cfs)    (deg.C)   pH   (ug/l as P)     (ug/l as P)    (ug/l as N)     (ug/l as N)     (ug/l as N)     (ug/l as N)
==================================================================================================================================
 JUL   1  26670.0    19.3   8.34            1                9             10              10 <            100              10

 AUG   1  11520.0    20.3   8.24            4                9             10              20              100              30

 SEP   1  11330.0    19.5   8.30            3               11             20              10 <            100              20

 OCT   1  14980.0    11.7   8.22            1                9             30              10 <            100 <            30

 NOV   1  17460.0     7.7   8.26            3                5             30              10 <            100              30

 DEC   1  15720.0     1.4   8.27            1                6             50              10 <            100 <            50

 JAN   1  17880.0     1.1   8.29            1                6             70              10 <            100              70

 FEB   1  21200.0     1.6   8.33            1                6             70              10 <            100              70

 MAR   1  18110.0     0.2   8.16            1                7             30              10 <            200              30

 APR   2  25070.0     5.4   8.42            1 <              9             20              10 <            100 <            20

 MAY   2  48950.0     7.4   8.29            1               12             20              10 <            450              20

 JUN   2  58960.0    12.5   8.14            4               14             30              10 <            300              30

==================================================================================================================================
N=     15      12      12     12           12               12             12              12               12              12
Max       58960.0    20.3   8.42            4               14             70              20              450              70
Min       11330.0     0.2   8.14            1 <              5             10              10 <            100 <            10
Mean      23987.5     9.0   8.27            2                9             33              10 <            129              34
Annual Nutrient Load (tons/year)        43.39           226.15         723.06           19.25          4434.14          742.31
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Frequency of Exceedence                                                      Frequency of Exceedence
 Phosphorus Criterion                     0%                                  Chronic Ammonia Criterion                     0%
 Nitrogen Criterion                       0%                                  Acute Ammonia Criterion                       0%
-----------------------------------------------                              -----------------------------------------------
Magnitude of Exceedence                                                      Magnitude of Exceedence
 Phosphorus Criterion                   0.2 X                                 Chronic Ammonia Criterion                   0.0 X
 Nitrogen Criterion                     0.0 X                                 Acute Ammonia Criterion                     0.0 X
-----------------------------------------------                              -----------------------------------------------
NUTRIENT ENRICHMENT SEVERITY SCORE                                           AMMONIA TOXICITY SEVERITY SCORE
 PHOSPHORUS                            0.00                                   CHRONIC                                   0.00
 NITROGEN                              0.00                                   ACUTE                                     0.00
-----------------------------------------------                              -----------------------------------------------
CUMULATIVE SCORE                       0.00
-----------------------------------------------
NOTE:Monthly average streamflows are USGS monthly means where available.

     Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are
     considered to be zero in the data computations.

     Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's
     between 6.5 and 9.0 only. Values outside of these ranges will result in errors.
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CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:30 Clark Fork below Cabinet Gorge Dam

Instantaneous Values

Date	Streamflow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 19	20100.0 (M)	19.2	8.34	1	10	10	10 <	100 <	10
Aug 08	17600.0 (M)	20.3	8.33	2	8	10 <	10 <	200	10 <
Sep 11	12100.0 (E)	19.2	8.34	2	11	20	10 <	200	20
Oct 17	19800.0 (M)	11.8	8.27	1	9	20	10 <	100 <	20
Nov 14	19100.0 (M)	7.0	8.23	1	8	20	10 <	100 <	20
Dec 20	21600.0 (M)	1.2	8.26	2	6	50	10 <	100 <	50
Jan 17	24000.0 (M)	1.6	8.29	1	7	70	10 <	200	70
Feb 13	22400.0 (M)	1.5	8.34	2	5	60	10 <	100	60
Mar 14	23100.0 (M)	0.8	8.18	1	7	30	10 <	200	30
Apr 11	25300.0 (M)	5.8	8.36	1	8	20	10 <	200	20
Apr 25	35100.0 (M)	4.8	8.30	1 <	8	20	10 <	300	20
May 16	38300.0 (M)	6.5	8.29	1	7	10 <	10 <	400	10 <
May 29	72200.0 (M)	8.7	8.30	1	15	40	10 <	700	40
Jun 12	77400.0 (M)	11.2	8.11	4	16	10 <	10 <	100	10 <
Jun 27	58600.0 (M)	13.2	8.20	3	11	30	10 <	200	30
N=	15	15	15	15	15	15	15	15	15
Max	77400.0	20.3	8.36	4	16	70	10 <	700	70
Min	12100.0	0.8	8.11	1 <	5	10 <	10 <	100 <	10 <
Mean	32446.7	8.9	8.28	2	9	26	10 <	187	26

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 30 Clark Fork below Cabinet Gorge Dam

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	29680.0	19.2	8.34	1	10	10	10 <	100 <	10
AUG	1	13160.0	20.3	8.33	2	8	10 <	10 <	200	10 <
SEP	1	12720.0	19.2	8.34	2	11	20	10 <	200	20
OCT	1	16480.0	11.8	8.27	1	9	20	10 <	100 <	20
NOV	1	20000.0	7.0	8.23	1	8	20	10 <	100 <	20
DEC	1	17930.0	1.2	8.26	2	6	50	10 <	100 <	50
JAN	1	19940.0	1.6	8.29	1	7	70	10 <	200	70
FEB	1	23960.0	1.5	8.34	2	5	60	10 <	100	60
MAR	1	20770.0	0.8	8.18	1	7	30	10 <	200	30
APR	2	28690.0	5.3	8.33	1 <	8	20	10 <	250	20
MAY	2	52670.0	7.6	8.30	1	11	20	10 <	550	20
JUN	2	62320.0	12.2	8.16	4	14	15	10 <	150	15
N=	15	12	12	12	12	12	12	12	12	12
Max		62320.0	20.3	8.34	4	14	70	10 <	550	70
Min		12720.0	0.8	8.16	1 <	5	10 <	10 <	100 <	10 <
Mean		26526.7	9.0	8.28	1	9	28	10 <	154	28
Annual Nutrient Load (tons/year)					41.78	247.05	667.27	0.00	5042.45	667.27

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.2 X
Nitrogen Criterion	0.0 X

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

CUMULATIVE SCORE 0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

APPENDIX B

STATE FISCAL YEAR 1991

CLARK FORK BASIN NUTRIENT MONITORING DATA

TRIBUTARY MONITORING STATIONS

Monitoring Station:00 Silver Bow Creek above Butte WWTP

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	7.0 (I)	11.4	7.80	15	66	1630	10 <	300	1630
Aug 06	6.6 (I)	11.6	7.73	21	56	1660	10 <	400	1660
Sep 11	9.3 (I)	8.4	7.61	25	114	1870	150	600	2020
Oct 16	10.2 (I)	5.8	7.86	45	178	1730	210	1100	1940
Nov 14	9.8 (I)	5.4	7.39	98	337	1680	780	1700	2460
Dec 19	8.0 (E)	0.0	7.82	42	158	2040	410	1100	2450
Jan 15	8.9 (I)	3.6	7.85	61	324	1740	530	2400	2270
Feb 12	8.7 (I)	2.6	7.48	47	198	1580	390	700	1970
Mar 13	7.8 (I)	2.2	7.82	20	114	1810	80	400	1890
Apr 08	10.8 (I)	0.8	7.67	37	139	1200	60	600	1260
Apr 23	10.3 (I)	3.9	7.72	29	113	1090	40	500	1130
May 14	22.3 (I)	7.0	7.96	53	137	650	30	500	680
May 29	16.8 (I)	7.8	7.57	47	104	810	40	800	850
Jun 11	16.5 (I)	11.1	7.71	51	124	860	30	600	890
Jun 24	14.5 (I)	9.0	7.60	30	118	1100	40	300	1140
N=	15	15	15	15	15	15	15	15	15
Max	22.3	11.6	7.96	98	337	2040	780	2400	2460
Min	6.6	0.0	7.39	15	56	650	10 <	300	680
Mean	11.2	6.0	7.71	41	152	1430	186	800	1616

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN
Station: 00 Silver Bow Creek above Butte WWTP

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	7.0	11.4	7.80	15	66	1630	10 <	300	1630
AUG	1	6.6	11.6	7.73	21	56	1660	10 <	400	1660
SEP	1	9.3	8.4	7.61	25	114	1870	150	600	2020
OCT	1	10.2	5.8	7.86	45	178	1730	210	1100	1940
NOV	1	9.8	5.4	7.39	98	337	1680	780	1700	2460
DEC	1	8.0	0.0	7.82	42	158	2040	410	1100	2450
JAN	1	8.9	3.6	7.85	61	324	1740	530	2400	2270
FEB	1	8.7	2.6	7.48	47	198	1580	390	700	1970
MAR	1	7.8	2.2	7.82	20	114	1810	80	400	1890
APR	2	10.6	2.4	7.70	33	126	1145	50	550	1195
MAY	2	19.6	7.4	7.77	50	121	730	35	650	765
JUN	2	15.5	10.1	7.66	41	121	980	35	450	1015
N=	15	12	12	12	12	12	12	12	12	12
Max		19.6	11.6	7.86	98	337	2040	780	2400	2460
Min		6.6	0.0	7.39	15	56	730	10 <	300	765
Mean		10.2	5.9	7.71	41	159	1550	223	863	1772
Annual Nutrient Load (tons/year)					0.43	1.58	14.35	2.03	8.47	16.38

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	88%

Magnitude of Exceedence	
Phosphorus Criterion	3.2 X
Nitrogen Criterion	1.8 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	3.19
NITROGEN	1.55

CUMULATIVE SCORE	4.74

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.1 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:01 Silver Bow Creek below Colorado Tailings

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	22.0 (M)	14.6	7.25	925	1150	2800	1450	2800	4250
Aug 06	26.0 (M)	14.4	7.56	734	1100	2150	1620	2900	3770
Sep 11	17.0 (M)	11.4	7.11	742	1030	2210	610	1600	2820
Oct 16	17.0 (M)	7.9	7.80	549	944	2170	1380	2100	3550
Nov 14	18.0 (M)	7.8	7.13	529	903	2270	1900	3600	4170
Dec 19	17.0 (M)	0.0	7.51	777	1280	2110	2520	4300	4630
Jan 15	16.0 (M)	5.0	7.45	560	1050	1340	3200	4400	4540
Feb 12	15.0 (M)	4.1	7.87	488	977	1130	2960	3400	4090
Mar 13	15.0 (M)	4.6	7.50	560	944	1190	3910	5200	5100
Apr 08	21.0 (M)	2.5	7.25	486	816	940	2630	3900	3570
Apr 23	21.0 (M)	5.7	7.65	483	850	810	2940	3600	3750
May 14	29.0 (M)	8.1	7.34	464	726	540	2100	3300	2640
May 29	22.0 (M)	9.4	7.69	563	802	660	2830	4300	3490
Jun 11	24.0 (M)	12.1	7.44	498	680	700	2060	3200	2760
Jun 24	22.0 (M)	10.0	7.38	324	546	950	2160	3300	3110
N=	15	15	15	15	15	15	15	15	15
Max	29.0	14.6	7.87	925	1280	2800	3910	5200	5100
Min	15.0	0.0	7.11	324	546	540	610	1600	2640
Mean	20.1	7.8	7.46	579	920	1465	2285	3460	3749

NOTE:Estimated streamflows are denoted with an (E) following the value.

Instantaneous streamflows (gaged) are denoted with an (I) following the value.

Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 01 Silver Bow Creek below Colorado Tailings

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	23.2	14.6	7.25	925	1150	2800	1450	2800	4250
AUG	1	25.8	14.4	7.56	734	1100	2150	1620	2900	3770
SEP	1	17.1	11.4	7.11	742	1030	2210	610	1600	2820
OCT	1	16.2	7.9	7.80	549	944	2170	1380	2100	3550
NOV	1	17.7	7.8	7.13	529	903	2270	1900	3600	4170
DEC	1	17.3	0.0	7.51	777	1280	2110	2520	4300	4630
JAN	1	16.1	5.0	7.45	560	1050	1340	3200	4400	4540
FEB	1	16.0	4.1	7.87	488	977	1130	2960	3400	4090
MAR	1	17.1	4.6	7.50	560	944	1190	3910	5200	5100
APR	2	19.0	4.1	7.45	485	833	875	2785	3750	3660
MAY	2	27.1	8.8	7.52	514	764	600	2465	3800	3065
JUN	2	27.7	11.1	7.41	411	613	825	2110	3250	2935
N=	15	12	12	12	12	12	12	12	12	12
Max		27.7	14.6	7.87	925	1280	2800	3910	5200	5100
Min		16.0	0.0	7.11	411	613	600	610	1600	2820
Mean		20.0	7.8	7.46	606	966	1639	2243	3425	3882
Annual Nutrient Load (tons/year)					11.99	18.77	31.77	43.42	67.19	75.19

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	100%
Magnitude of Exceedence	
Phosphorus Criterion	19.3 X
Nitrogen Criterion	3.9 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	19.31
NITROGEN	3.88
CUMULATIVE SCORE	23.20

Frequency of Exceedence	
Chronic Ammonia Criterion	67%
Acute Ammonia Criterion	0%
Magnitude of Exceedence	
Chronic Ammonia Criterion	1.2 X
Acute Ammonia Criterion	0.2 X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.81
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN
Monitoring Station:02 Silver Bow Creek at Miles Crossing near Ramsay
Instantaneous Values

Date	Streamflow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	28.4 (I)	11.5	8.40	279	464	1140	420	1000	1560
Aug 06	17.8 (I)	16.0	8.36	246	465	2470	20	700	2490
Sep 11	28.1 (I)	10.2	7.60	171	449	1390	140	600	1530
Oct 16	35.8 (I)	4.8	7.58	159	385	1410	520	1000	1930
Nov 14	30.0 (E)	4.8	7.52	159	397	1710	830	1400	2540
Dec 19	28.0 (E)	0.0	7.68	163	317	1380	1190	1600	2570
Jan 15	27.3 (I)	2.4	7.47	246	686	920	2020	3100	2940
Feb 12	18.1 (I)	2.3	7.27	332	795	990	3370	3700	4360
Mar 13	28.0 (I)	2.1	7.38	125	518	760	1890	2700	2650
Apr 08	31.0 (I)	1.7	7.21	121	500	650	1520	2300	2170
Apr 23	34.4 (I)	5.1	7.65	118	567	540	1420	2100	1960
May 14	37.0 (I)	8.6	7.47	141	570	760	980	2000	1740
May 29	51.5 (I)	10.0	8.00	135	400	510	870	2000	1380
Jun 11	36.2 (I)	13.0	7.64	152	502	1060	820	1600	1880
Jun 24	44.0 (I)		7.65	81	357	990	740	1400	1730
N=	15	14	15	15	15	15	15	15	15
Max	51.5	16.0	8.40	332	795	2470	3370	3700	4360
Min	17.8	0.0	7.21	81	317	510	20	600	1380
Mean	31.7	6.6	7.66	175	491	1112	1117	1813	2229

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 03 Silver Bow Creek at frontage road above Warm Springs Ponds

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	31.9	17.8	8.85	58	252	1100	10 <	800	1100
AUG	1	19.3	16.5	8.71	49	181	960	10 <	800	960
SEP	1	36.3	11.7	8.16	60	269	1370	10 <	800	1370
OCT	1	45.6	4.8	8.39	102	289	1570	100	500	1670
NOV	1	40.0	3.9	7.60	106	323	1830	270	700	2100
DEC	1	36.0	0.0	7.76	154	289	2060	990	1500	3050
JAN	1	31.8	0.6	7.26	144	417	1350	1450	2300	2800
FEB	1	36.4	0.6	7.38	139	406	980	1110	1400	2090
MAR	1	38.8	1.4	7.36	94	375	1020	1100	1700	2120
APR	2	46.5	4.0	7.54	49	413	795	770	1550	1565
MAY	2	93.4	8.5	7.92	78	335	690	330	1000	1020
JUN	2	104.8	10.9	7.90	54	186	675	125	600	800
N=	15	12	12	12	12	12	12	12	12	12
Max		104.8	17.8	8.85	154	417	2060	1450	2300	3050
Min		19.3	0.0	7.26	49	181	675	10 <	500	800
Mean		46.7	6.7	7.90	91	311	1200	520	1138	1720
Annual Nutrient Load (tons/year)					3.92	13.94	50.27	21.23	48.63	71.50

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	83%

Magnitude of Exceedence	
Phosphorus Criterion	6.2 X
Nitrogen Criterion	1.7 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	6.22
NITROGEN	1.43

CUMULATIVE SCORE	7.66

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.3 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:04 Discharge from AMC Pond 2 (Silver Bow Creek)

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	28.7 (I)	23.5	9.28	63	101	20	10	500	30
Aug 06	19.8 (I)	22.5	9.19	49	73	20	10 <	600	20
Sep 12	46.8 (I)	17.0	9.14	96	134	20	10	500	30
Oct 16	45.0 (I)	4.2	8.15	10	34	80	10 <	500	80
Nov 14	40.0 (E)	3.8	7.92	3	22	50	10 <	100	50
Dec 19	25.4 (I)	0.0	8.35	5	33	400	10	400	410
Jan 15	31.6 (I)	1.1	7.87	8	46	630	80	600	710
Feb 12	29.1 (I)	1.8	8.36	19	85	780	330	600	1110
Mar 13	51.1 (I)	0.9	7.94	7	128	500	50	700	550
Apr 08	58.9 (I)	3.1	8.45	3	149	340	10 <	900	340
Apr 23	43.3 (I)	13.7	8.98	3	153	10	10 <	1100	10
May 14	73.6 (I)	9.4	7.98	17	66	270	90	500	360
May 29	118.6 (I)	13.1	9.25	24	78	120	20	1000	140
Jun 11	157.6 (I)	18.0	9.18	29	96	10 <	10 <	700	10 <
Jun 24	86.5 (I)		8.62	26	73	10 <	10 <	500	10 <
N=	15	14	15	15	15	15	15	15	15
Max	157.6	23.5	9.28	96	153	780	330	1100	1110
Min	19.8	0.0	7.87	3	22	10 <	10 <	100	10 <
Mean	57.1	9.4	8.58	24	85	216	40	613	256

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 04 Discharge from AMC Pond 2 (Silver Bow Creek)

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	28.7	23.5	9.28	63	101	20	10	500	30
AUG	1	19.8	22.5	9.19	49	73	20	10 <	600	20
SEP	1	46.8	17.0	9.14	96	134	20	10	500	30
OCT	1	45.0	4.2	8.15	10	34	80	10 <	500	80
NOV	1	40.0	3.8	7.92	3	22	50	10 <	100	50
DEC	1	25.4	0.0	8.35	5	33	400	10	400	410
JAN	1	31.6	1.1	7.87	8	46	630	80	600	710
FEB	1	29.1	1.8	8.36	19	85	780	330	600	1110
MAR	1	51.1	0.9	7.94	7	128	500	50	700	550
APR	2	51.1	8.4	8.72	3	151	175	10 <	1000	175
MAY	2	96.1	11.3	8.62	21	72	195	55	750	250
JUN	2	122.1	18.0	8.90	28	85	10 <	10 <	600	10 <
N=	15	12	12	12	12	12	12	12	12	12
Max		122.1	23.5	9.28	96	151	780	330	1000	1110
Min		19.8	0.0	7.87	3	22	10 <	10 <	100	10 <
Mean		48.9	9.4	8.54	26	80	239	45	571	285
Annual Nutrient Load (tons/year)					1.19	4.03	9.27	1.67	29.10	10.94

Frequency of Exceedence	
Phosphorus Criterion	67%
Nitrogen Criterion	8%

Magnitude of Exceedence	
Phosphorus Criterion	1.6 X
Nitrogen Criterion	0.3 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	1.07
NITROGEN	0.02

CUMULATIVE SCORE	1.09

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.1 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:05 Mill-Willow Bypass at mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	1.6 (I)	25.0	8.04	11	13	170	170	500	340
Aug 06	1.1 (I)	18.8	8.09	5	9	190	270	800	460
Sep 12	0.5 (E)	16.7	8.40	3	14	160	660	700	820
Oct 16	0.0 (I)								
Nov 14	0.0 (I)								
Dec 19	8.0 (E)	0.0	8.08	9	39	220	170	400	390
Jan 15	10.2 (I)	0.9	7.79	9	26	180	200	500	380
Feb 12	10.5 (I)	1.2	8.06	7	36	140	140	100 <	280
Mar 13	11.5 (I)	3.3	7.80	4	16	60	80	200	140
Apr 08	13.3 (I)	2.8	8.31	8	28	60	90	300	150
Apr 23	13.9 (I)	10.3	8.38	6	24	30	60	200	90
May 14	31.7 (I)	9.0	7.96	15	57	30	20	300	50
May 29	90.2 (I)	10.7	8.55	23	46	40	10	700	50
Jun 11	196.8 (I)	12.3	8.46	20	50	10 <	10 <	200	10 <
Jun 24	92.7 (I)		8.51	15	26	10 <	10 <	200	10 <
N=	15	12	13	13	13	13	13	13	13
Max	196.8	25.0	8.55	23	57	220	660	800	820
Min	0.0	0.0	7.79	3	9	10 <	10 <	100 <	10 <
Mean	32.1	9.3	8.19	10	30	98	144	385	242

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 05 Mill-Willow Bypass at mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	1.6	25.0	8.04	11	13	170	170	500	340
AUG	1	1.1	18.8	8.09	5	9	190	270	800	460
SEP	1	0.5	16.7	8.40	3	14	160	660	700	820
OCT	0	0.0								
NOV	0	0.0								
DEC	1	8.0	0.0	8.08	9	39	220	170	400	390
JAN	1	10.2	0.9	7.79	9	26	180	200	500	380
FEB	1	10.5	1.2	8.06	7	36	140	140	100 <	280
MAR	1	11.5	3.3	7.80	4	16	60	80	200	140
APR	2	13.6	6.6	8.35	7	26	45	75	250	120
MAY	2	61.0	9.9	8.26	19	52	35	15	500	50
JUN	2	144.8	12.3	8.49	18	38	10 <	10 <	200	10 <
N=	13	12	10	10	10	10	10	10	10	10
Max		144.8	25.0	8.49	19	52	220	660	800	820
Min		0.0	0.0	7.79	3	9	10 <	10 <	100 <	10 <
Mean		21.9	9.5	8.13	9	27	120	178	405	298
Annual Nutrient Load (tons/year)					0.33	0.83	0.74	0.70	6.22	1.45

Frequency of Exceedence	
Phosphorus Criterion	5%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.5 X
Nitrogen Criterion	0.3 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.03
NITROGEN	0.00

CUMULATIVE SCORE	0.03

Frequency of Exceedence	
Chronic Ammonia Criterion	10%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.3 X
Acute Ammonia Criterion	0.1 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.03
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:06 Warm Springs Creek at mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	6.2 (I)	22.0	8.35	10	19	40	10 <	300	40
Aug 06	3.9 (I)	22.0	8.40	5	16	10 <	10 <	300	10 <
Sep 12	11.3 (I)	14.7	8.46	3	29	40	10 <	200	40
Oct 16	32.1 (I)	5.2	8.20	3	17	50	10 <	400	50
Nov 14	31.0 (M)	4.7	8.02	3	9	60	10 <	100 <	60
Dec 19	14.0 (E)	0.0	8.19	4	12	210	20	200	230
Jan 15	21.4 (E)	0.0	7.75	5	11	160	10 <	400	160
Feb 12	22.6 (I)	3.0	7.87	3	12	100	10 <	100 <	100
Mar 13	20.3 (I)	4.0	8.15	3	8	50	10 <	200	50
Apr 08	9.9 (I)	4.0	8.25	3	9	90	10 <	300	90
Apr 23	15.4 (I)	11.5	8.24	3	12	30	10 <	100 <	30
May 14	24.4 (I)	9.2	7.88	4	16	30	10 <	200	30
May 29	91.2 (I)	8.3	8.66	4	16	40	10 <	600	40
Jun 11	244.0 (I)	10.6	8.31	6	36	20	10 <	500	20
Jun 24	159.6 (I)		8.32	4	15	30	10 <	200	30
N=	15	14	15	15	15	15	15	15	15
Max	244.0	22.0	8.66	10	36	210	20	600	230
Min	3.9	0.0	7.75	3	8	10 <	10 <	100 <	10 <
Mean	47.2	8.5	8.20	4	16	63	10 <	253	65

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Station: 06 Warm Springs Creek at mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	25.2	22.0	8.35	10	19	40	10 <	300	40
AUG	1	8.5	22.0	8.40	5	16	10 <	10 <	300	10 <
SEP	1	10.3	14.7	8.46	3	29	40	10 <	200	40
OCT	1	24.5	5.2	8.20	3	17	50	10 <	400	50
NOV	1	29.4	4.7	8.02	3	9	60	10 <	100 <	60
DEC	1	17.7	0.0	8.19	4	12	210	20	200	230
JAN	1	12.5	0.0	7.75	5	11	160	10 <	400	160
FEB	1	24.1	3.0	7.87	3	12	100	10 <	100 <	100
MAR	1	18.9	4.0	8.15	3	8	50	10 <	200	50
APR	2	13.3	7.8	8.25	3	11	60	10 <	150	60
MAY	2	59.5	8.8	8.27	4	16	35	10 <	400	35
JUN	2	180.0	10.6	8.32	5	26	25	10 <	350	25
N=	15	12	12	12	12	12	12	12	12	12
Max		180.0	22.0	8.46	10	29	210	20	400	230
Min		8.5	0.0	7.75	3	8	10 <	10 <	100 <	10 <
Mean		35.3	8.6	8.19	4	15	69	10 <	242	71
Annual Nutrient Load (tons/year)					0.16	0.66	1.70	0.03	10.10	1.73

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	0.3 X
Nitrogen Criterion	0.1 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00
CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%
Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:07.3 Lost Creek at frontage road

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	4.9 (I)			8	19	10 <	10 <	300	10 <
Aug 06	6.1 (I)			4	11	10	10 <	300	10
Sep 11	36.3 (I)			4	10	180	10 <	200	180
Oct 16	37.9 (I)			2	8	250	10 <	300	250
Nov 14	38.0 (E)			2	6	380	10 <	100	380
Dec 19	40.0 (E)			6	20	860	70	300	930
Jan 16	42.2 (I)			8	28	570	10	500	580
Feb 12	37.0 (I)			4	25	450	10 <	100 <	450
Mar 13	36.8 (I)			4	19	430	10 <	200	430
Apr 08	47.3 (I)			4	37	340	10 <	300	340
Apr 23	45.3 (I)			3	34	230	10 <	300	230
May 14	37.4 (I)			4	25	180	10 <	200	180
May 29	16.9 (I)			3	16	180	10 <	600	180
Jun 11	32.9 (I)			7	22	80	10 <	300	80
Jun 24	21.1 (I)			3	11	120	10 <	200	120
N=	15	0	0	15	15	15	15	15	15
Max	47.3			8	37	860	70	600	930
Min	4.9			2	6	10 <	10 <	100 <	10 <
Mean	32.0			4	19	284	10 <	273	289

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 07.3 Lost Creek at frontage road

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	4.9			8	19	10 <	10 <	300	10 <
AUG	1	6.1			4	11	10	10 <	300	10
SEP	1	36.3			4	10	180	10 <	200	180
OCT	1	37.9			2	8	250	10 <	300	250
NOV	1	38.0			2	6	380	10 <	100	380
DEC	1	40.0			6	20	860	70	300	930
JAN	1	42.2			8	28	570	10	500	580
FEB	1	37.0			4	25	450	10 <	100 <	450
MAR	1	36.8			4	19	430	10 <	200	430
APR	2	46.3			4	36	285	10 <	300	285
MAY	2	27.2			4	21	180	10 <	400	180
JUN	2	27.0			5	17	100	10 <	250	100
N=	15	12	0	0	12	12	12	12	12	12
Max		46.3			8	36	860	70	500	930
Min		4.9			2	6	10 <	10 <	100 <	10 <
Mean		31.6			5	18	308	10 <	263	315
Annual Nutrient Load (tons/year)					0.13	0.60	11.65	0.27	8.08	11.92

Frequency of Exceedence

Phosphorus Criterion	0%
Nitrogen Criterion	0%

Magnitude of Exceedence

Phosphorus Criterion	0.4 X
Nitrogen Criterion	0.3 X

NUTRIENT ENRICHMENT SEVERITY SCORE

PHOSPHORUS	0.00
NITROGEN	0.00

CUMULATIVE SCORE 0.00

Frequency of Exceedence

Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR

Magnitude of Exceedence

Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X

AMMONIA TOXICITY SEVERITY SCORE

CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:10.2 Little Blackfoot River near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	103.0 (M)			17	28	10 <	10 <	200	10 <
Aug 07	79.0 (M)			24	33	30	10 <	200	30
Sep 12	48.0 (M)			18	44	10 <	10 <	200	10 <
Oct 17	62.0 (E)			17	27	10 <	10 <	400	10 <
Nov 15	62.0 (E)			18	29	10 <	10 <	200	10 <
Dec 20	36.0 (E)			21	37	60	10 <	300	60
Jan 16	52.0 (E)			22	37	70	10 <	300	70
Feb 13	51.0 (M)			12	34	40	10 <	100 <	40
Mar 14	61.0 (M)			17	28	10 <	10 <	300	10 <
Apr 09	115.0 (M)			10	30	30	10 <	500	30
Apr 24	172.0 (M)			13	50	20	10 <	400	20
May 15	319.0 (M)			15	95	50	10 <	800	50
May 30	443.0 (M)			33	40	30	10 <	1100	30
Jun 12	305.0 (M)			21	35	10 <	10 <	500	10 <
Jun 25	226.0 (M)			22	35	10 <	10	300	10
N=	15	0	0	15	15	15	15	15	15
Max	443.0			33	95	70	10	1100	70
Min	36.0			10	27	10 <	10 <	100 <	10 <
Mean	142.3			19	39	22	10 <	380	23

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 10.2 Little Blackfoot River near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	117.0			17	28	10 <	10 <	200	10 <
AUG	1	63.8			24	33	30	10 <	200	30
SEP	1	50.4			18	44	10 <	10 <	200	10 <
OCT	1	57.5			17	27	10 <	10 <	400	10 <
NOV	1	65.0			18	29	10 <	10 <	200	10 <
DEC	1	47.4			21	37	60	10 <	300	60
JAN	1	45.7			22	37	70	10 <	300	70
FEB	1	75.9			12	34	40	10 <	100 <	40
MAR	1	74.1			17	28	10 <	10 <	300	10 <
APR	2	129.0			12	40	25	10 <	450	25
MAY	2	384.0			24	68	40	10 <	950	40
JUN	2	297.0			22	35	10 <	10 <	400	10 <
N=	15	12	0	0	12	12	12	12	12	12
Max		384.0			24	68	70	10 <	950	70
Min		45.7			12	27	10 <	10 <	100 <	10 <
Mean		117.2			19	37	22	10 <	325	22
Annual Nutrient Load (tons/year)					2.29	4.99	2.44	0.00	55.77	2.44

Frequency of Exceedence	
Phosphorus Criterion	4%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.7 X
Nitrogen Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.03
NITROGEN	0.00

CUMULATIVE SCORE	0.03

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR

Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:10.7 Gold Creek near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	21.1 (I)			96	116	10	10 <	300	10
Aug 07	17.5 (I)			107	106	10	10 <	100	10
Sep 12	8.7 (I)			101	117	20	10 <	300	20
Oct 17	19.7 (I)			61	72	10 <	10 <	400	10 <
Nov 15	16.9 (I)			56	68	10 <	10 <	100	10 <
Dec 20	10.0 (E)			71	77	100	10 <	100	100
Jan 16	11.3 (I)			52	64	80	10 <	300	80
Feb 13	10.7 (I)			50	81	50	10 <	100 <	50
Mar 14	10.9 (I)			44	59	10 <	10 <	300	10 <
Apr 09	12.7 (I)			35	59	20	10 <	200	20
Apr 24	13.6 (I)			36	78	10 <	10 <	400	10 <
May 15	0.8 (I)			125	176	60	20	800	80
May 30	7.3 (I)			86	133	30	10 <	1400	30
Jun 12	69.3 (I)			61	105	10 <	10 <	400	10 <
Jun 25	44.6 (I)			84	93	10 <	10 <	300	10 <
N=	15	0	0	15	15	15	15	15	15
Max	69.3			125	176	100	20	1400	100
Min	0.8			35	59	10 <	10 <	100 <	10 <
Mean	18.3			71	94	25	10 <	360	27

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Station: 10.7 Gold Creek near mouth

Monthly Average Values

Month	N=	Stream-flow *(cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	21.1			96	116	10	10 <	300	10
AUG	1	17.5			107	106	10	10 <	100	10
SEP	1	8.7			101	117	20	10 <	300	20
OCT	1	19.7			61	72	10 <	10 <	400	10 <
NOV	1	16.9			56	68	10 <	10 <	100	10 <
DEC	1	10.0			71	77	100	10 <	100	100
JAN	1	11.3			52	64	80	10 <	300	80
FEB	1	10.7			50	81	50	10 <	100 <	50
MAR	1	10.9			44	59	10 <	10 <	300	10 <
APR	2	13.2			36	69	10	10 <	300	10
MAY	2	4.1			106	155	45	10	1100	55
JUN	2	57.0			73	99	10 <	10 <	350	10 <
N=	15	12	0	0	12	12	12	12	12	12
Max		57.0			107	155	100	10	1100	100
Min		4.1			36	59	10 <	10 <	100 <	10 <
Mean		16.7			71	90	27	10 <	304	28
Annual Nutrient Load (tons/year)					1.17	1.48	0.27	0.00	4.62	0.27

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	1.8 X
Nitrogen Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	1.80
NITROGEN	0.00

CUMULATIVE SCORE	1.80

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR

Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:11.5 Flint Creek at New Chicago

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	13.1 (I)			54	68	10	10 <	500	10
Aug 07	14.1 (I)			70	81	20	10 <	300	20
Sep 12	63.0 (M)			65	79	20	10 <	300	20
Oct 17	129.0 (M)			16	37	20	10 <	300	20
Nov 15	113.0 (M)			12	28	10 <	10 <	200	10 <
Dec 18	65.0 (E)			24	39	210	10 <	100	210
Jan 15	95.0 (E)								
Feb 11	81.0 (E)			28	45	200	10	100 <	210
Mar 12	74.0 (M)			11	32	40	10 <	400	40
Apr 09	95.0 (M)			14	65	40	10 <	500	40
Apr 24	100.0 (M)			15	71	10 <	10 <	500	10 <
May 14	23.0 (M)			14	38	10	10 <	200	10
May 28	98.0 (M)			57	87	120	10 <	600	120
Jun 11	254.0 (M)			31	84	60	10	600	70
Jun 25	167.0 (M)			38	58	20	10 <	400	20
N=	15	0	0	14	14	14	14	14	14
Max	254.0			70	87	210	10	600	210
Min	13.1			11	28	10 <	10 <	100 <	10 <
Mean	92.3			32	58	55	10 <	350	56

NOTE:Estimated streamflows are denoted with an (E) following the value.

Instantaneous streamflows (gaged) are denoted with an (I) following the value.

Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 11.5 Flint Creek at New Chicago

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	13.1			54	68	10	10 <	500	10
AUG	1	14.1			70	81	20	10 <	300	20
SEP	1	63.0			65	79	20	10 <	300	20
OCT	1	108.0			16	37	20	10 <	300	20
NOV	1	109.0			12	28	10 <	10 <	200	10 <
DEC	1	75.8			24	39	210	10 <	100	210
JAN	0	70.2								
FEB	1	85.6			28	45	200	10	100 <	210
MAR	1	83.2			11	32	40	10 <	400	40
APR	2	95.3			15	68	20	10 <	500	20
MAY	2	98.3			36	63	65	10 <	400	65
JUN	2	164.0			35	71	40	10 <	500	45
N=	14	12	0	0	11	11	11	11	11	11
Max		164.0			70	81	210	10	500	210
Min		13.1			11	28	10 <	10 <	100 <	10 <
Mean		81.6			33	56	59	10 <	318	60
Annual Nutrient Load (tons/year)					1.99	3.89	4.43	0.06	24.08	4.57

Frequency of Exceedence	
Phosphorus Criterion	50%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	1.1 X
Nitrogen Criterion	0.1 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.56
NITROGEN	0.00
CUMULATIVE SCORE	0.56

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR
Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:12.5 Rock Creek near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	486.0 (M)			7	13	10 <	10 <	100	10 <
Aug 05	300.0 (M)			6	13	10 <	10 <	300	10 <
Sep 10	227.0 (M)			4	12	10 <	10 <	200	10 <
Oct 15	224.0 (M)			4	12	20	10 <	500	20
Nov 12	219.0 (M)			5	11	10 <	10 <	100 <	10 <
Dec 18	120.0 (E)			6	13	30	10 <	100 <	30
Jan 15	169.0 (M)			10	15	50	10 <	400	50
Feb 11	145.0 (M)			4	10	10 <	10 <	100 <	10 <
Mar 12	157.0 (M)			5	9	10 <	10 <	200	10 <
Apr 09	258.0 (M)			5	14	10 <	10 <	200	10 <
Apr 24	299.0 (M)			6	21	10 <	10 <	200	10 <
May 14	568.0 (M)			7	34	10	10 <	200	10
May 28	1580.0 (M)			10	22	20	10 <	400	20
Jun 11	2300.0 (M)			11	30	10 <	10 <	400	10 <
Jun 25	1200.0 (M)			10	17	10 <	10 <	200	10 <
N=	15	0	0	15	15	15	15	15	15
Max	2300.0			11	34	50	10 <	500	50
Min	120.0			4	9	10 <	10 <	100 <	10 <
Mean	550.1			7	16	10 <	10 <	220	10 <

NOTE:Estimated streamflows are denoted with an (E) following the value.

Instantaneous streamflows (gaged) are denoted with an (I) following the value.

Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 12.5 Rock Creek near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	542.0			7	13	10 <	10 <	100	10 <
AUG	1	287.0			6	13	10 <	10 <	300	10 <
SEP	1	214.0			4	12	10 <	10 <	200	10 <
OCT	1	218.0			4	12	20	10 <	500	20
NOV	1	206.0			5	11	10 <	10 <	100 <	10 <
DEC	1	138.0			6	13	30	10 <	100 <	30
JAN	1	146.0			10	15	50	10 <	400	50
FEB	1	168.0			4	10	10 <	10 <	100 <	10 <
MAR	1	163.0			5	9	10 <	10 <	200	10 <
APR	2	252.0			6	18	10 <	10 <	200	10 <
MAY	2	1001.0			9	28	15	10 <	300	15
JUN	2	1689.0			11	24	10 <	10 <	300	10 <
N=	15	12	0	0	12	12	12	12	12	12
Max		1689.0			11	28	50	10 <	500	50
Min		138.0			4	9	10 <	10 <	100 <	10 <
Mean		418.7			6	15	10 <	10 <	208	10
Annual Nutrient Load (tons/year)					3.25	8.00	2.57	0.00	102.02	2.57

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.3 X
Nitrogen Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00

CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR

Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's
between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:14 Blackfoot River at USGS station near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	1510.0 (M)	17.0	8.53	2	9	10 <	10 <	200	10 <
Aug 08	816.0 (M)	18.9	8.59	2	9	10	10 <	300	10
Sep 10	722.0 (M)	14.9	8.48	1	8	10 <	10 <	100	10 <
Oct 15	648.0 (M)	4.8	8.40	2	7	20	10 <	100	20
Nov 12	848.0 (M)	3.0	8.38	1	9	30	10 <	100 <	30
Dec 18	705.0 (M)	0.0	8.43	2	7	20	10 <	100 <	20
Jan 15	630.0 (E)	0.8	8.32	6	13	100	10 <	200	100
Feb 11	550.0 (E)	1.0	8.44	3	9	30	10 <	100 <	30
Mar 12	758.0 (M)	1.4	8.54	5	18	10	10 <	200	10
Apr 09	1750.0 (M)	4.2	8.36	5	26	10 <	10 <	300	10 <
Apr 25	2900.0 (M)	5.4	8.20	1	50	70	10 <	400	70
May 14	4830.0 (M)	5.5	8.31	5	76	100	10 <	400	100
May 28	6500.0 (M)	5.0	8.23	6	46	80	10 <	300	80
Jun 11	6540.0 (M)	10.5	8.24	5	35	30	10 <	400	30
Jun 25	4640.0 (M)	10.8	8.38	4	20	20	10 <	200	20
N=	15	15	15	15	15	15	15	15	15
Max	6540.0	18.9	8.59	6	76	100	10 <	400	100
Min	550.0	0.0	8.20	1	7	10 <	10 <	100 <	10 <
Mean	2289.8	6.9	8.39	3	23	35	10 <	207	35

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 14 Blackfoot River at USGS station near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	1844.0	17.0	8.53	2	9	10 <	10 <	200	10 <
AUG	1	889.0	18.9	8.59	2	9	10	10 <	300	10
SEP	1	732.0	14.9	8.48	1	8	10 <	10 <	100	10 <
OCT	1	628.0	4.8	8.40	2	7	20	10 <	100	20
NOV	1	801.0	3.0	8.38	1	9	30	10 <	100 <	30
DEC	1	593.0	0.0	8.43	2	7	20	10 <	100 <	20
JAN	1	529.0	0.8	8.32	6	13	100	10 <	200	100
FEB	1	678.0	1.0	8.44	3	9	30	10 <	100 <	30
MAR	1	785.0	1.4	8.54	5	18	10	10 <	200	10
APR	2	1802.0	4.8	8.28	3	38	35	10 <	350	35
MAY	2	5255.0	5.3	8.27	6	61	90	10 <	350	90
JUN	2	5482.0	10.7	8.31	5	28	25	10 <	300	25
N=	15	12	12	12	12	12	12	12	12	12
Max		5482.0	18.9	8.59	6	61	100	10 <	350	100
Min		529.0	0.0	8.27	1	7	10 <	10 <	100 <	10 <
Mean		1668.2	6.9	8.41	3	18	31	10 <	175	31
Annual Nutrient Load (tons/year)					6.38	50.55	67.03	0.00	423.83	67.03

Frequency of Exceedence	
Phosphorus Criterion	4%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	0.4 X
Nitrogen Criterion	0.0 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.01
NITROGEN	0.00
CUMULATIVE SCORE	0.01

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%
Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:18.5 Bitterroot River at HW 93 crossing

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	1360.0 (M)			5	16	20	10 <	200	20
Aug 05	855.0 (M)			7	18	30	10 <	300	30
Sep 10	825.0 (M)			7	20	20	10 <	300	20
Oct 15	875.0 (M)			3	12	30	10 <	400	30
Nov 12	1160.0 (M)			2	10	20	10 <	100 <	20
Dec 18	650.0 (E)			5	13	90	10 <	100 <	90
Jan 15	915.0 (M)			36	64	190	30	500	220
Feb 11	644.0 (M)			7	18	110	10 <	100 <	110
Mar 12	840.0 (M)			6	16	80	10 <	300	80
Apr 10	1630.0 (M)			4	27	80	10 <	200	80
Apr 25	2210.0 (M)			2	50	50	10 <	400	50
May 14	3350.0 (M)			5	43	80	10 <	300	80
May 28	6830.0 (M)			5	23	60	10 <	400	60
Jun 11	11300.0 (M)			6	29	10	10 <	400	10
Jun 26	6280.0 (M)			6	16	20	10	300	30
N=	15	0	0	15	15	15	15	15	15
Max	11300.0			36	64	190	30	500	220
Min	644.0			2	10	10	10 <	100 <	10
Mean	2648.3			7	25	59	10 <	267	62

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Station: 18.5 Bitterroot River at HW 93 crossing

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	2210.0			5	16	20	10 <	200	20
AUG	1	986.0			7	18	30	10 <	300	30
SEP	1	766.0			7	20	20	10 <	300	20
OCT	1	957.0			3	12	30	10 <	400	30
NOV	1	1097.0			2	10	20	10 <	100 <	20
DEC	1	706.0			5	13	90	10 <	100 <	90
JAN	1	695.0			36	64	190	30	500	220
FEB	1	766.0			7	18	110	10 <	100 <	110
MAR	1	823.0			6	16	80	10 <	300	80
APR	2	1446.0			3	39	65	10 <	300	65
MAY	2	4812.0			5	33	70	10 <	350	70
JUN	2	8437.0			6	23	15	10 <	350	20
N=	15	12	0	0	12	12	12	12	12	12
Max		8437.0			36	64	190	30	500	220
Min		695.0			2	10	15	10 <	100 <	20
Mean		1975.1			8	23	62	10 <	250	65
Annual Nutrient Load (tons/year)					12.01	47.26	85.75	1.74	576.38	90.90

Frequency of Exceedence	
Phosphorus Criterion	8%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.5 X
Nitrogen Criterion	0.1 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.04
NITROGEN	0.00

CUMULATIVE SCORE	0.04

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR

Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:19 Bitterroot River near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	1580.0 (E)	20.6	8.36	4	16	40	10 <	200	40
Aug 05	900.0 (E)	21.1	8.53	6	17	60	10 <	300	60
Sep 10	850.0 (E)	18.3	8.71	5	19	40	10 <	200	40
Oct 15	940.0 (E)	8.4	8.46	4	13	50	10 <	400	50
Nov 12	1220.0 (E)	6.0	8.62	3	11	40	10 <	100 <	40
Dec 18	650.0 (E)	2.1	8.29	3	12	120	30	200	150
Jan 15	950.0 (E)	2.8	8.08	32	60	210	30	600	240
Feb 11	760.0 (E)	3.0	8.30	8	17	140	10 <	100 <	140
Mar 12	1010.0 (E)	3.5	8.26	6	17	90	10 <	200	90
Apr 10	1910.0 (E)	4.9	7.74	5	25	80	10 <	400	80
Apr 25	2240.0 (E)	6.9	7.77	1 <	55	40	10 <	400	40
May 14	3550.0 (E)	7.6	7.96	5	45	70	10 <	300	70
May 28	7300.0 (E)	5.8	7.61	5	22	60	10 <	300	60
Jun 11	11200.0 (E)	10.8	7.52	6	29	10	10 <	300	10
Jun 26	6490.0 (E)	11.0	7.74	6	17	20	10 <	200	20
N=	15	15	15	15	15	15	15	15	15
Max	11200.0	21.1	8.71	32	60	210	30	600	240
Min	650.0	2.1	7.52	1 <	11	10	10 <	100 <	10
Mean	2770.0	8.9	8.13	7	25	71	10 <	267	75

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Station: 19 Bitterroot River near mouth

Monthly Average Values

Month	N=	Streamflow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	2378.0	20.6	8.36	4	16	40	10 <	200	40
AUG	1	1045.0	21.1	8.53	6	17	60	10 <	300	60
SEP	1	782.0	18.3	8.71	5	19	40	10 <	200	40
OCT	1	1011.0	8.4	8.46	4	13	50	10 <	400	50
NOV	1	1151.0	6.0	8.62	3	11	40	10 <	100 <	40
DEC	1	726.0	2.1	8.29	3	12	120	30	200	150
JAN	1	743.0	2.8	8.08	32	60	210	30	600	240
FEB	1	901.0	3.0	8.30	8	17	140	10 <	100 <	140
MAR	1	974.0	3.5	8.26	6	17	90	10 <	200	90
APR	2	1637.0	5.9	7.76	3	40	60	10 <	400	60
MAY	2	5141.0	6.7	7.79	5	34	65	10 <	300	65
JUN	2	8487.0	10.9	7.63	6	23	15	10 <	250	15
N=	15	12	12	12	12	12	12	12	12	12
Max		8487.0	21.1	8.71	32	60	210	30	600	240
Min		726.0	2.1	7.63	3	11	15	10 <	100 <	15
Mean		2081.3	9.1	8.23	7	23	78	10 <	254	83
Annual Nutrient Load (tons/year)					12.05	50.44	106.97	3.68	531.34	110.65

Frequency of Exceedence	
Phosphorus Criterion	13%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.5 X
Nitrogen Criterion	0.1 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.06
NITROGEN	0.00

CUMULATIVE SCORE	0.06

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:22.5 Ninemile Creek near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	54.2 (I)			5	15	10 <	10 <	200	10 <
Aug 06	35.0 (I)			5	11	10 <	10 <	200	10 <
Sep 10	25.2 (I)			5	12	10 <	10 <	200	10 <
Oct 16	40.6 (I)			4	16	10 <	10 <	200	10 <
Nov 13	30.6 (I)			3	8	10 <	10 <	100 <	10 <
Dec 19	67.7 (I)			3	12	30	10 <	100	30
Jan 15	32.8 (I)			6	12	60	10 <	100	60
Feb 12	31.7 (I)			3	13	30	10 <	100 <	30
Mar 12	66.1 (I)			3	12	10 <	10 <	200	10 <
Apr 10	171.0 (I)			4	20	60	10 <	200	60
Apr 24	329.0 (I)			3	20	20	10 <	200	20
May 15	356.0 (I)			2	17	10 <	10 <	400	10 <
May 28	303.0 (I)			6	36	50	10 <	400	50
Jun 11	240.0 (I)			6	18	10 <	10 <	400	10 <
Jun 26	130.0 (I)			5	17	10 <	10 <	200	10 <
N=	15	0	0	15	15	15	15	15	15
Max	356.0			6	36	60	10 <	400	60
Min	25.2			2	8	10 <	10 <	100 <	10 <
Mean	127.5			4	16	17	10 <	200	17

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 22.5 Ninemile Creek near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	54.2			5	15	10 <	10 <	200	10 <
AUG	1	35.0			5	11	10 <	10 <	200	10 <
SEP	1	25.2			5	12	10 <	10 <	200	10 <
OCT	1	40.6			4	16	10 <	10 <	200	10 <
NOV	1	30.6			3	8	10 <	10 <	100 <	10 <
DEC	1	67.7			3	12	30	10 <	100	30
JAN	1	32.8			6	12	60	10 <	100	60
FEB	1	31.7			3	13	30	10 <	100 <	30
MAR	1	66.1			3	12	10 <	10 <	200	10 <
APR	2	250.0			4	20	40	10 <	200	40
MAY	2	329.5			4	27	25	10 <	400	25
JUN	2	185.0			6	18	10 <	10 <	300	10 <
N=	15	12	0	0	12	12	12	12	12	12
Max		329.5			6	27	60	10 <	400	60
Min		25.2			3	8	10 <	10 <	100 <	10 <
Mean		95.7			4	15	15	10 <	175	15
Annual Nutrient Load (tons/year)					0.39	1.79	1.90	0.00	24.06	1.90

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.3 X
Nitrogen Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00

CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR

Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:23.7 Fish Creek near mouth

Instantaneous Values

Date	Streamflow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	306.0 (I)			2	3	10	10 <	100	10
Aug 06	167.0 (I)			2	4	20	10 <	100 <	20
Sep 10	96.2 (I)			1	4	10 <	10 <	200	10 <
Oct 16	164.0 (I)			1	7	10	10 <	100 <	10
Nov 13	195.0 (I)			3	4	20	10 <	100 <	20
Dec 19	152.0 (I)			3	6	50	10 <	100	50
Jan 16	141.0 (I)			14	5	60	10 <	100 <	60
Feb 12	127.0 (I)			2	5	20	10 <	100 <	20
Mar 13	227.0 (I)			2	3	30	10 <	100	30
Apr 10	448.0 (I)			3	7	60	10 <	100	60
Apr 24	753.0 (I)			1	14	130	10 <	100	130
May 15	1160.0 (I)			3	7	110	10 <	200	110
May 29	1260.0 (I)			1	16	100	10 <	600	100
Jun 12	1680.0 (I)			1	12	30	10 <	300	30
Jun 26	1000.0 (I)			1	6	20	10 <	200	20
N=	15	0	0	15	15	15	15	15	15
Max	1680.0			14	16	130	10 <	600	130
Min	96.2			1	3	10 <	10 <	100 <	10 <
Mean	525.1			3	7	45	10 <	133	45

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 23.7 Fish Creek near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	306.0			2	3	10	10 <	100	10
AUG	1	167.0			2	4	20	10 <	100 <	20
SEP	1	96.2			1	4	10 <	10 <	200	10 <
OCT	1	164.0			1	7	10	10 <	100 <	10
NOV	1	195.0			3	4	20	10 <	100 <	20
DEC	1	152.0			3	6	50	10 <	100	50
JAN	1	141.0			14	5	60	10 <	100 <	60
FEB	1	127.0			2	5	20	10 <	100 <	20
MAR	1	227.0			2	3	30	10 <	100	30
APR	2	600.5			2	11	95	10 <	100	95
MAY	2	1210.0			2	12	105	10 <	400	105
JUN	2	1340.0			1	9	25	10 <	250	25
N=	15	12	0	0	12	12	12	12	12	12
Max		1340.0			14	12	105	10 <	400	105
Min		96.2			1	3	10 <	10 <	100 <	10 <
Mean		393.8			3	6	37	10 <	104	37
Annual Nutrient Load (tons/year)					0.82	3.21	21.02	0.00	79.65	21.02

Frequency of Exceedence
- Phosphorus Criterion 0%
- Nitrogen Criterion 0%

Magnitude of Exceedence
- Phosphorus Criterion 0.1 X
- Nitrogen Criterion 0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE
- PHOSPHORUS 0.00
- NITROGEN 0.00

CUMULATIVE SCORE 0.00

Frequency of Exceedence
- Chronic Ammonia Criterion ERR
- Acute Ammonia Criterion ERR

Magnitude of Exceedence
- Chronic Ammonia Criterion ERR X
- Acute Ammonia Criterion ERR X

AMMONIA TOXICITY SEVERITY SCORE
- CHRONIC ERR
- ACUTE ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:23.9 Trout Creek near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	35.0 (E)			4	11	10	10 <	100	10
Aug 06	51.4 (I)			11	19	10 <	10 <	100 <	10 <
Sep 10	25.7 (I)			23	41	10 <	10 <	100	10 <
Oct 16	38.2 (I)			1	4	10 <	10 <	100 <	10 <
Nov 13	44.4 (I)			1	3	30	10 <	100 <	30
Dec 19	46.7 (I)			2	3	90	10 <	100 <	90
Jan 16	34.5 (I)			3	3	100	10 <	100 <	100
Feb 12	27.1 (I)			1	3	40	10 <	100 <	40
Mar 13	47.8 (I)			2	4	30	10 <	100	30
Apr 10	109.0 (I)			1	5	90	10 <	200	90
Apr 24	226.0 (I)			1	8	250	10 <	200	250
May 15	400.0 (I)			2	6	220	10 <	300	220
May 29	316.0 (I)			1	7	160	10 <	600	160
Jun 12	500.0 (I)			1	7	60	10 <	200	60
Jun 26	342.0 (I)			1	4	30	10 <	200	30
N=	15	0	0	15	15	15	15	15	15
Max	500.0			23	41	250	10 <	600	250
Min	25.7			1	3	10 <	10 <	100 <	10 <
Mean	149.6			4	9	74	10 <	133	74

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 23.9 Trout Creek near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	35.0			4	11	10	10 <	100	10
AUG	1	46.0			11	19	10 <	10 <	100 <	10 <
SEP	1	25.7			23	41	10 <	10 <	100	10 <
OCT	1	38.2			1	4	10 <	10 <	100 <	10 <
NOV	1	61.6			1	3	30	10 <	100 <	30
DEC	1	46.7			2	3	90	10 <	100 <	90
JAN	1	34.5			3	3	100	10 <	100 <	100
FEB	1	27.1			1	3	40	10 <	100 <	40
MAR	1	57.4			2	4	30	10 <	100	30
APR	2	167.5			1	7	170	10 <	200	170
MAY	2	435.0			2	7	190	10 <	450	190
JUN	2	486.0			1	6	45	10 <	200	45
N=	15	12	0	0	12	12	12	12	12	12
Max		486.0			23	41	190	10 <	450	190
Min		25.7			1	3	10 <	10 <	100 <	10 <
Mean		121.7			4	9	59	10 <	100 <	59
Annual Nutrient Load (tons/year)					0.25	0.80	12.02	0.00	27.90	12.02

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	0.2 X
Nitrogen Criterion	0.1 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00
CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR
Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:24.7 St. Regis River near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	301.0 (I)			2	3	40	10 <	100 <	40
Aug 06	190.0 (I)			2	5	10	10 <	100 <	10
Sep 10	114.0 (I)			1 <	5	10 <	10 <	200	10 <
Oct 16	292.0 (I)			2	10	10 <	10 <	100	10 <
Nov 13	371.0 (I)			2	5	10 <	10 <	100 <	10 <
Dec 19	335.0 (I)			3	6	50	10 <	100	50
Jan 16	297.0 (I)			2	7	20	10 <	200	20
Feb 12	301.0 (I)			2	5	20	10 <	100 <	20
Mar 13	516.0 (I)			5	4	10 <	10 <	200	10 <
Apr 10	1120.0 (I)			4	8	30	10 <	100	30
Apr 24	1860.0 (I)			4	21	20	10 <	200	20
May 15	1890.0 (I)			3	9	10 <	10 <	300	10 <
May 29	1740.0 (I)			1	13	60	10 <	800	60
Jun 12	2040.0 (I)			4	12	10 <	10 <	200	10 <
Jun 26	1160.0 (I)			3	7	10 <	10 <	300	10 <
N=	15	0	0	15	15	15	15	15	15
Max	2040.0			5	21	60	10 <	800	60
Min	114.0			1 <	3	10 <	10 <	100 <	10 <
Mean	835.1			3	8	17	10 <	180	17

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

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CLARK FORK BASIN MONITORING - FY 1991                        MONTANA WATER QUALITY BUREAU                               GARY INGMAN
Station:  24.7  St. Regis River near mouth
                                                       Monthly Average Values
------------------------------------------------------------------------------------------------------------------------------------
          Stream-   Water           Diss.Ortho P      Total P      Diss.NO3+NO2     Diss.NH3+NH4      Total KJL-N        TSIN
           flow     Temp.           (SRP) Conc.        Conc.          Conc.            Conc.            Conc.           Conc.
 Month N=  (cfs)   (deg.C)    pH   (ug/l as P)     (ug/l as P)    (ug/l as N)      (ug/l as N)      (ug/l as N)     (ug/l as N)
====================================================================================================================================
  JUL   1   301.0                          2               3             40               10  <           100  <          40

  AUG   1   190.0                          2               5             10               10  <           100  <          10

  SEP   1   114.0                          1  <            5             10  <            10  <           200             10  <

  OCT   1   292.0                          2              10             10  <            10  <           100             10  <

  NOV   1   371.0                          2               5             10  <            10  <           100  <          10  <

  DEC   1   335.0                          3               6             50               10  <           100             50

  JAN   1   297.0                          2               7             20               10  <           200             20

  FEB   1   301.0                          2               5             20               10  <           100  <          20

  MAR   1   516.0                          5               4             10  <            10  <           200             10  <

  APR   2  1490.0                          4              15             25               10  <           150             25

  MAY   2  1815.0                          2              11             30               10  <           550             30

  JUN   2  1600.0                          4              10             10  <            10  <           250             10  <

====================================================================================================================================
 N=    15      12         0      0        12              12             12               12              12              12
 Max         1815.0                        5              15             50               10  <           550             50
 Min          114.0                        1  <            3             10  <            10  <           100  <          10  <
 Mean         635.2                        2               7             16               10  <           146             16
 Annual Nutrient Load (tons/year)       1.82            5.87          11.08             0.00          154.47           11.08
------------------------------------------------------------------------------------------------------------------------------------
 Frequency of Exceedence                                                        Frequency of Exceedence
  Phosphorus Criterion                     0%                                    Chronic Ammonia Criterion                ERR
  Nitrogen Criterion                       0%                                    Acute Ammonia Criterion                  ERR
---------------------------------------------------                           ----------------------------------------------------
 Magnitude of Exceedence                                                        Magnitude of Exceedence
  Phosphorus Criterion                   0.1 X                                   Chronic Ammonia Criterion                ERR X
  Nitrogen Criterion                     0.0 X                                   Acute Ammonia Criterion                  ERR X
---------------------------------------------------                           ----------------------------------------------------
 NUTRIENT ENRICHMENT SEVERITY SCORE                                             AMMONIA TOXICITY SEVERITY SCORE
  PHOSPHORUS                            0.00                                     CHRONIC                                  ERR
  NITROGEN                              0.00                                     ACUTE                                    ERR
---------------------------------------------------                           ----------------------------------------------------
 CUMULATIVE SCORE                       0.00
---------------------------------------------------
NOTE:Monthly average streamflows are USGS monthly means where available.

     Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are
     considered to be zero in the data computations.

     Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's
     between 6.5 and 9.0 only. Values outside of these ranges will result in errors.
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CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN
Monitoring Station:26 Flathead River near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	12300.0 (M)	22.3	8.73	1 <	5	10 <	10 <	100	10 <
Aug 08	10800.0 (M)	22.3	8.81	2	6	10 <	10 <	100 <	10 <
Sep 11	8400.0 (M)	21.2	8.96	1	9	10 <	10 <	100 <	10 <
Oct 17	12400.0 (M)	8.8	8.53	1 <	7	10	10 <	100 <	10
Nov 13	12200.0 (M)	6.8	8.44	1	4	20	10 <	200	20
Dec 19	12600.0 (M)	0.0	8.27	1	4	60	10 <	100 <	60
Jan 17	15000.0 (M)	2.1	8.31	5	18	70	10 <	100	70
Feb 13	16000.0 (M)	3.8	8.40	1	7	50	10 <	100 <	50
Mar 13	13400.0 (M)	1.4	8.31	1	5	30	10 <	200	30
Apr 11	13700.0 (M)	5.3	8.40	1	7	30	10 <	100	30
Apr 24	14900.0 (M)	6.3	8.42	1 <	9	30	10 <	200	30
May 15	13300.0 (M)	8.1	8.42	2	6	10 <	10 <	400	10 <
May 29	42200.0 (M)	8.6	8.43	1 <	10	30	10 <	700	30
Jun 12	41900.0 (M)	11.8	8.25	2	11	10 <	10 <	400	10 <
Jun 27	35200.0 (M)	13.7	8.31	1 <	12	20	10 <	200	20
N=	15	15	15	15	15	15	15	15	15
Max	42200.0	22.3	8.96	5	18	70	10 <	700	70
Min	8400.0	0.0	8.25	1 <	4	10 <	10 <	100 <	10 <
Mean	18286.7	9.5	8.47	1	8	23	10 <	173	23

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 26 Flathead River near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	17460.0	22.3	8.73	1 <	5	10 <	10 <	100	10 <
AUG	1	7579.0	22.3	8.81	2	6	10 <	10 <	100 <	10 <
SEP	1	8922.0	21.2	8.96	1	9	10 <	10 <	100 <	10 <
OCT	1	11690.0	8.8	8.53	1 <	7	10	10 <	100 <	10
NOV	1	11940.0	6.8	8.44	1	4	20	10 <	200	20
DEC	1	12260.0	0.0	8.27	1	4	60	10 <	100 <	60
JAN	1	13390.0	2.1	8.31	5	18	70	10 <	100	70
FEB	1	15480.0	3.8	8.40	1	7	50	10 <	100 <	50
MAR	1	12840.0	1.4	8.31	1	5	30	10 <	200	30
APR	2	14350.0	5.8	8.41	1 <	8	30	10 <	150	30
MAY	2	26840.0	8.4	8.43	1	8	15	10 <	550	15
JUN	2	33290.0	12.8	8.28	1	12	10	10 <	300	10
N=	15	12	12	12	12	12	12	12	12	12
Max		33290.0	22.3	8.96	5	18	70	10 <	550	70
Min		7579.0	0.0	8.27	1 <	4	10 <	10 <	100 <	10 <
Mean		15503.4	9.6	8.49	1	8	25	10 <	133	25
Annual Nutrient Load (tons/year)					16.75	124.23	354.78	0.00	2880.12	354.78

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.2 X
Nitrogen Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00

CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	0%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	0.0 X
Acute Ammonia Criterion	0.0 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	0.00
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:26.6 Little Bitterroot River near mouth

Instantaneous Values

Date	Stream-flow (cfs)		Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 19	5.0	(E)			101	197	10 <	10 <	700	10 <
Aug 7	17.5	(I)			131	207	10 <	10	700	10
Sep 11	14.6	(I)			71	145	10 <	10 <	700	10 <
Oct 17	7.7	(I)			72	142	10 <	10 <	600	10 <
Nov 14	13.2	(I)			48	85	10 <	10 <	400	10 <
Dec 20	20.0	(E)			59	90	70	30	500	100
Jan 17	20.0	(E)			502	688	400	630	2600	1030
Feb 13	20.0	(E)			102	182	90	100	600	190
Mar 13	88.2	(E)			55	108	20	10 <	800	20
Apr 11	130.0	(I)			65	198	10 <	10 <	900	10 <
Apr 25	106.0	(I)			74	186	20	10 <	900	20
May 16	58.0	(I)			79	135	10 <	10 <	900	10 <
May 30	92.8	(I)			62	186	30	20	1300	50
Jun 13	80.7	(I)			92	225	10 <	80	1000	80
Jun 27	75.1	(I)			142	250	30	30	1100	60
N=	15		0	0	15	15	15	15	15	15
Max	130.0				502	688	400	630	2600	1030
Min	5.0				48	85	10 <	10 <	400	10 <
Mean	49.9				110	202	44	60	913	104

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 26.6 Little Bitterroot River near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	5.0			101	197	10 <	10 <	700	10 <
AUG	1	17.5			131	207	10 <	10	700	10
SEP	1	13.7			71	145	10 <	10 <	700	10 <
OCT	1	7.9			72	142	10 <	10 <	600	10 <
NOV	1	12.5			48	85	10 <	10 <	400	10 <
DEC	1	20.0			59	90	70	30	500	100
JAN	1	20.0			502	688	400	630	2600	1030
FEB	1	20.0			102	182	90	100	600	190
MAR	1	88.2			55	108	20	10 <	800	20
APR	2	118.0			70	192	10	10 <	900	10
MAY	2	75.4			71	161	15	10	1100	25
JUN	2	77.9			117	238	15	55	1050	70
N=	15	12	0	0	12	12	12	12	12	12
Max		118.0			502	688	400	630	2600	1030
Min		5.0			48	85	10 <	10 <	400	10 <
Mean		39.7			117	203	52	70	888	121
Annual Nutrient Load (tons/year)					3.75	7.43	1.35	1.68	37.00	3.03

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	8%

Magnitude of Exceedence	
Phosphorus Criterion	4.1 X
Nitrogen Criterion	0.1 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	4.06
NITROGEN	0.01

CUMULATIVE SCORE	4.07

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR

Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN
Monitoring Station:26.7 Crow Creek near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 19	30.6 (I)			96	123	60	10 <	400	60
Aug 07	31.5 (I)			121	140	30	10	300	40
Sep 11	28.8 (I)			53	86	10	10 <	400	10
Oct 17	23.0 (I)			8	35	110	10 <	300	110
Nov 14	89.4 (I)			8	24	140	20	400	160
Dec 20	81.5 (I)			11	27	400	30	300	430
Jan 17	30.1 (I)			52	98	710	180	800	890
Feb 13	44.6 (I)			32	72	700	90	1500	790
Mar 13	42.8 (I)			6	41	490	10 <	500	490
Apr 11	52.6 (I)			7	47	390	20	700	410
Apr 25	24.6 (I)			5	31	300	20	400	320
May 16	24.2 (I)			8	33	120	10 <	500	120
May 30	165.0 (I)			8	55	80	10	1000	90
Jun 13	137.0 (I)			24	49	10 <	30	500	30
Jun 27	165.0 (I)			45	74	100	50	500	150
N=	15	0	0	15	15	15	15	15	15
Max	165.0			121	140	710	180	1500	890
Min	23.0			5	24	10 <	10 <	300	10
Mean	64.7			32	62	243	31	567	273

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 26.7 Crow Creek near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	30.6			96	123	60	10 <	400	60
AUG	1	31.5			121	140	30	10	300	40
SEP	1	28.8			53	86	10	10 <	400	10
OCT	1	23.0			8	35	110	10 <	300	110
NOV	1	89.4			8	24	140	20	400	160
DEC	1	81.5			11	27	400	30	300	430
JAN	1	30.1			52	98	710	180	800	890
FEB	1	44.6			32	72	700	90	1500	790
MAR	1	42.8			6	41	490	10 <	500	490
APR	2	38.6			6	39	345	20	550	365
MAY	2	94.6			8	44	100	10 <	750	105
JUN	2	151.0			35	62	50	40	500	90
N=	15	12	0	0	12	12	12	12	12	12
Max		151.0			121	140	710	180	1500	890
Min		23.0			6	24	10	10 <	300	10
Mean		57.2			36	66	262	33	558	295
Annual Nutrient Load (tons/year)					1.60	3.16	12.57	1.68	30.85	14.29

Frequency of Exceedence	
Phosphorus Criterion	50%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	1.3 X
Nitrogen Criterion	0.3 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.66
NITROGEN	0.00
CUMULATIVE SCORE	0.66

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR
Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:26.8 Coleman Coulee near mouth

Instantaneous Values

Date	Stream-flow (cfs)		Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 19	4.6	(M)			135	215	10 <	10 <	800	10 <
Aug 7	8.5	(M)			160	188	20	20	800	40
Sep 11	0.8	(M)			116	181	10	10	800	20
Oct 17	4.3	(I)			73	109	70	10 <	700	70
Nov 14	2.4	(I)			68	126	340	30	800	370
Dec 20	4.5	(I)			122	154	810	560	1500	1370
Jan 17	39.2	(I)			1010	1280	870	3050	8000	3920
Feb 13	29.1	(I)			274	571	390	1500	3300	1890
Mar 13	1.7	(I)			184	281	300	430	1900	730
Apr 11	1.3	(I)			91	190	30	40	1500	70
Apr 25	0.6	(I)			210	343	70	50	2100	120
May 16	12.1	(I)			131	292	10 <	40	1800	40
May 30	7.0	(I)			231	636	170	180	3000	350
Jun 13	9.5	(I)			123	241	60	40	1200	100
Jun 27	20.3	(I)			216	332	130	70	1600	200
N=	15		0	0	15	15	15	15	15	15
Max	39.2				1010	1280	870	3050	8000	3920
Min	0.6				68	109	10 <	10 <	700	10 <
Mean	9.7				210	343	218	401	1987	619

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 26.8 Coleman Coulee near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	4.6			135	215	10 <	10 <	800	10 <
AUG	1	8.5			160	188	20	20	800	40
SEP	1	0.8			116	181	10	10	800	20
OCT	1	4.3			73	109	70	10 <	700	70
NOV	1	2.4			68	126	340	30	800	370
DEC	1	4.5			122	154	810	560	1500	1370
JAN	1	39.2			1010	1280	870	3050	8000	3920
FEB	1	29.1			274	571	390	1500	3300	1890
MAR	1	1.7			184	281	300	430	1900	730
APR	2	0.9			151	267	50	45	1800	95
MAY	2	9.6			181	464	85	110	2400	195
JUN	2	14.9			170	287	95	55	1400	150
N=	15	12	0	0	12	12	12	12	12	12
Max		39.2			1010	1280	870	3050	8000	3920
Min		0.8			68	109	10 <	10 <	700	10 <
Mean		10.0			220	344	253	484	2017	738
Annual Nutrient Load (tons/year)					4.55	6.57	4.35	13.73	39.35	18.08

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	25%
Magnitude of Exceedence	
Phosphorus Criterion	6.9 X
Nitrogen Criterion	0.7 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	6.87
NITROGEN	0.18
CUMULATIVE SCORE	7.05

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR
Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:26.9 Mission Creek near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 19	142.6 (I)			76	98	10 <	10 <	500	10 <
Aug 7	170.5 (I)			58	79	30	10 <	400	30
Sep 11	217.8 (I)			51	84	40	10 <	500	40
Oct 17	168.3 (I)			4	19	160	10 <	200	160
Nov 14	168.4 (I)			7	18	210	10 <	200	210
Dec 20	106.5 (I)			15	24	490	20	200	510
Jan 17	198.2 (I)			146	274	620	510	1300	1130
Feb 13	161.1 (I)			30	81	400	120	600	520
Mar 13	133.7 (I)			10	35	230	10 <	400	230
Apr 11	115.2 (I)			5	20	180	10 <	200	180
Apr 25	107.6 (I)			4	28	160	10 <	200	160
May 16	148.1 (I)			26	90	20	10	800	30
May 30	173.0 (I)			37	115	120	10	1300	130
Jun 13	143.5 (I)			26	66	60	10 <	500	60
Jun 27	346.3 (I)			22	90	70	10 <	600	70
N=	15	0	0	15	15	15	15	15	15
Max	346.3			146	274	620	510	1300	1130
Min	106.5			4	18	10 <	10 <	200	10 <
Mean	166.7			34	75	186	45	527	231

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 26.9 Mission Creek near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	142.6			76	98	10 <	10 <	500	10 <
AUG	1	170.5			58	79	30	10 <	400	30
SEP	1	217.8			51	84	40	10 <	500	40
OCT	1	168.3			4	19	160	10 <	200	160
NOV	1	168.4			7	18	210	10 <	200	210
DEC	1	106.5			15	24	490	20	200	510
JAN	1	198.2			146	274	620	510	1300	1130
FEB	1	161.1			30	81	400	120	600	520
MAR	1	133.7			10	35	230	10 <	400	230
APR	2	111.4			5	24	170	10 <	200	170
MAY	2	160.6			32	103	70	10	1050	80
JUN	2	244.9			24	78	65	10 <	550	65
N=	15	12	0	0	12	12	12	12	12	12
Max		244.9			146	274	620	510	1300	1130
Min		106.5			4	18	10 <	10 <	200	10 <
Mean		165.3			38	76	207	55	508	262
Annual Nutrient Load (tons/year)					6.75	13.55	32.06	10.22	87.84	42.27

Frequency of Exceedence	
Phosphorus Criterion	58%
Nitrogen Criterion	8%
Magnitude of Exceedence	
Phosphorus Criterion	1.5 X
Nitrogen Criterion	0.3 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.89
NITROGEN	0.02
CUMULATIVE SCORE	0.91

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR
Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:27.5 Thompson River at USGS station near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	370.0 (E)			6	12	10 <	10 <	100 <	10 <
Aug 08	265.0 (M)			6	10	10 <	10 <	100	10 <
Sep 11	189.0 (E)			4	10	10 <	10 <	100 <	10 <
Oct 16	199.0 (M)			4	10	20	10 <	100 <	20
Nov 13	225.0 (M)			4	10	10 <	10 <	100	10 <
Dec 19	214.0 (M)			8	12	50	10 <	100 <	50
Jan 16	300.0 (M)			4	16	40	10 <	300	40
Feb 13	314.0 (M)			4	11	10 <	10 <	100	10 <
Mar 13	438.0 (M)			4	13	10 <	10 <	300	10 <
Apr 10	919.0 (M)			6	20	10	10 <	200	10
Apr 24	1490.0 (M)			7	43	20	10 <	300	20
May 15	1690.0 (M)			8	20	10 <	10 <	300	10 <
May 29	1520.0 (M)			5	17	30	10 <	700	30
Jun 12	1990.0 (M)			10	22	10 <	10 <	200	10 <
Jun 26	1100.0 (M)			7	14	10 <	10 <	200	10 <
N=	15	0	0	15	15	15	15	15	15
Max	1990.0			10	43	50	10 <	700	50
Min	189.0			4	10	10 <	10 <	100 <	10 <
Mean	748.2			6	16	11	10 <	187	11

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 27.5 Thompson River at USGS station near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	409.0			6	12	10 <	10 <	100 <	10 <
AUG	1	255.0			6	10	10 <	10 <	100	10 <
SEP	1	188.0			4	10	10 <	10 <	100 <	10 <
OCT	1	184.0			4	10	20	10 <	100 <	20
NOV	1	295.0			4	10	10 <	10 <	100	10 <
DEC	1	273.0			8	12	50	10 <	100 <	50
JAN	1	240.0			4	16	40	10 <	300	40
FEB	1	419.0			4	11	10 <	10 <	100	10 <
MAR	1	438.0			4	13	10 <	10 <	300	10 <
APR	2	966.0			7	32	15	10 <	250	15
MAY	2	1661.0			7	19	15	10 <	500	15
JUN	2	1433.0			9	18	10 <	10 <	200	10 <
N=	15	12	0	0	12	12	12	12	12	12
Max		1661.0			9	32	50	10 <	500	50
Min		184.0			4	10	10 <	10 <	100 <	10 <
Mean		563.4			5	14	12	10 <	154	12
Annual Nutrient Load (tons/year)					3.48	9.70	5.50	0.00	136.75	5.50

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	0.3 X
Nitrogen Criterion	0.0 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00
CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR
Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:27.7 Prospect Creek at USGS station near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	134.0 (M)			5	8	10 <	10 <	100 <	10 <
Aug 08	97.0 (M)			4	6	10 <	10 <	100 <	10 <
Sep 11	64.0 (M)			3	6	10 <	10 <	100 <	10 <
Oct 16	58.0 (M)			3	6	10	10 <	100 <	10
Nov 13	169.0 (M)			3	7	20	10 <	100 <	20
Dec 19	231.0 (E)			5	8	30	10 <	100 <	30
Jan 16	155.0 (M)			3	6	10 <	10 <	100 <	10 <
Feb 12	217.0 (M)			3	8	10	10 <	100 <	10
Mar 13	291.0 (M)			4	7	20	10 <	100	20
Apr 11	468.0 (M)			5	10	20	10 <	100 <	20
Apr 25	741.0 (M)			3	14	20	10 <	100	20
May 15	770.0 (M)			4	8	10 <	10 <	200	10 <
May 29	661.0 (M)			3	12	20	10 <	900	20
Jun 12	880.0 (M)			7	18	10 <	10 <	200	10 <
Jun 27	486.0 (M)			4	7	10 <	10 <	100 <	10 <
N=	15	0	0	15	15	15	15	15	15
Max	880.0			7	18	30	10 <	900	30
Min	58.0			3	6	10 <	10 <	100 <	10 <
Mean	361.5			4	9	10	10 <	100	10

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 27.7 Prospect Creek at USGS station near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	170.0			5	8	10 <	10 <	100 <	10 <
AUG	1	88.8			4	6	10 <	10 <	100 <	10 <
SEP	1	62.8			3	6	10 <	10 <	100 <	10 <
OCT	1	54.2			3	6	10	10 <	100 <	10
NOV	1	255.0			3	7	20	10 <	100 <	20
DEC	1	214.0			5	8	30	10 <	100 <	30
JAN	1	153.0			3	6	10 <	10 <	100 <	10 <
FEB	1	320.0			3	8	10	10 <	100 <	10
MAR	1	292.0			4	7	20	10 <	100	20
APR	2	497.0			4	12	20	10 <	100 <	20
MAY	2	793.0			4	10	10	10 <	550	10
JUN	2	629.0			6	13	10 <	10 <	100	10 <
N=	15	12	0	0	12	12	12	12	12	12
Max		793.0			6	13	30	10 <	550	30
Min		54.2			3	6	10 <	10 <	100 <	10 <
Mean		294.1			4	8	10	10 <	100 <	10
Annual Nutrient Load (tons/year)					1.16	2.72	3.19	0.00	43.96	3.19

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	0.2 X
Nitrogen Criterion	0.0 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00
CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR
Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:28.3 Beaver Creek near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 19	12.0 (E)			4	8	10 <	10 <	100 <	10 <
Aug 08	9.4 (I)			6	11	10 <	10 <	100 <	10 <
Sep 11	0.3 (I)			2	15	10 <	10 <	100 <	10 <
Oct 17	0.0 (I)								
Nov 14	92.9 (I)			5	12	20	10 <	100 <	20
Dec 20	146.0 (I)			6	18	20	10 <	100 <	20
Jan 16	70.1 (I)			4	12	10 <	10 <	100 <	10 <
Feb 13	130.0 (I)			3	12	10 <	10 <	100 <	10 <
Mar 14	161.0 (I)			6	10	10 <	10 <	200	10 <
Apr 11	363.0 (I)			7	16	10	10 <	100 <	10
Apr 25	601.0 (I)			6	26	20	10 <	200	20
May 16	488.0 (I)			6	11	10 <	10 <	200	10 <
May 29	336.0 (I)			4	14	10 <	50	700	50
Jun 12	493.0 (I)			10	15	10 <	10 <	100	10 <
Jun 27	228.0 (I)			8	10	10 <	10 <	100	10 <
N=	15	0	0	14	14	14	14	14	14
Max	601.0			10	26	20	50	700	50
Min	0.0			2	8	10 <	10 <	100 <	10 <
Mean	208.7			6	14	10 <	10 <	107	10 <

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 28.3 Beaver Creek near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	12.0			4	8	10 <	10 <	100 <	10 <
AUG	1	7.8			6	11	10 <	10 <	100 <	10 <
SEP	1	0.3			2	15	10 <	10 <	100 <	10 <
OCT	0	0.0								
NOV	1	710.0			5	12	20	10 <	100 <	20
DEC	1	146.0			6	18	20	10 <	100 <	20
JAN	1	70.1			4	12	10 <	10 <	100 <	10 <
FEB	1	130.0			3	12	10 <	10 <	100 <	10 <
MAR	1	196.0			6	10	10 <	10 <	200	10 <
APR	2	482.0			7	21	15	10 <	100	15
MAY	2	412.0			5	13	10 <	25	450	25
JUN	2	360.5			9	13	10 <	10 <	100	10 <
N=	14	12	0	0	11	11	11	11	11	11
Max		710.0			9	21	20	25	450	25
Min		0.0			2	8	10 <	10 <	100 <	10 <
Mean		210.6			5	13	10 <	10 <	100 <	10 <
Annual Nutrient Load (tons/year)					1.21	2.89	1.98	0.86	25.58	2.84

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	0.3 X
Nitrogen Criterion	0.0 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00
CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR
Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:28.5 Vermilion River near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 19	156.0 (I)			4	8	10 <	10 <	100	10 <
Aug 08	118.0 (I)			5	7	10 <	10 <	100 <	10 <
Sep 11	82.1 (I)			3	7	10 <	10 <	100 <	10 <
Oct 17	74.1 (I)			4	6	10 <	10 <	100 <	10 <
Nov 14	126.0 (I)			5	7	10 <	10 <	100 <	10 <
Dec 20	220.0 (I)			5	13	30	10 <	100 <	30
Jan 17	200.0 (E)			3	7	20	10 <	100 <	20
Feb 13	200.0 (E)			4	7	10	10 <	100 <	10
Mar 14	444.0 (E)			5	6	10 <	10 <	100	10 <
Apr 11	320.0 (I)			5	10	10 <	10 <	100 <	10 <
Apr 25	659.0 (I)			5	14	20	10 <	200	20
May 16	691.0 (I)			6	11	10 <	10 <	200	10 <
May 29	506.0 (I)			4	10	40	10 <	700	40
Jun 12	606.0 (I)			6	11	10 <	10 <	100	10 <
Jun 27	307.0 (I)			5	7	10 <	10 <	100	10 <
N=	15	0	0	15	15	15	15	15	15
Max	691.0			6	14	40	10 <	700	40
Min	74.1			3	6	10 <	10 <	100 <	10 <
Mean	313.9			5	9	10 <	10 <	100	10 <

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 28.5 Vermilion River near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	156.0			4	8	10 <	10 <	100	10 <
AUG	1	104.0			5	7	10 <	10 <	100 <	10 <
SEP	1	82.1			3	7	10 <	10 <	100 <	10 <
OCT	1	75.2			4	6	10 <	10 <	100 <	10 <
NOV	1	369.0			5	7	10 <	10 <	100 <	10 <
DEC	1	220.0			5	13	30	10 <	100 <	30
JAN	1	200.0			3	7	20	10 <	100 <	20
FEB	1	200.0			4	7	10	10 <	100 <	10
MAR	1	329.0			5	6	10 <	10 <	100	10 <
APR	2	512.0			5	12	10	10 <	100	10
MAY	2	598.5			5	11	20	10 <	450	20
JUN	2	456.5			6	9	10 <	10 <	100	10 <
N=	15	12	0	0	12	12	12	12	12	12
Max		598.5			6	13	30	10 <	450	30
Min		75.2			3	6	10 <	10 <	100 <	10 <
Mean		275.2			4	8	10 <	10 <	100 <	10 <
Annual Nutrient Load (tons/year)					1.29	2.44	2.45	0.00	34.38	2.45

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%

Magnitude of Exceedence	
Phosphorus Criterion	0.2 X
Nitrogen Criterion	0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00

CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR

Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:28.6 Rock Creek at HW 200 crossing near mouth

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 19	18.0 (E)			2	7	10	10 <	200	10
Aug 08	16.5 (I)			3	4	10 <	10 <	100 <	10 <
Sep 11	4.0 (I)			2	6	10 <	10 <	100 <	10 <
Oct 17	0.1 (I)			3	7	50	10 <	100 <	50
Nov 14	56.0 (I)			2	4	20	10 <	100 <	20
Dec 20	50.0 (E)			2	5	30	10 <	100 <	30
Jan 17	50.0 (E)			1	3	30	10 <	100 <	30
Feb 13	28.1 (I)			2	3	40	10 <	100 <	40
Mar 14	25.8 (I)			1	2	10	10 <	100 <	10
Apr 11	72.2 (I)			2	4	20	10 <	100 <	20
Apr 25	258.0 (I)			1 <	7	50	10 <	100 <	50
May 16	321.0 (I)			2	6	10 <	10 <	300	10 <
May 29	221.0 (I)			6	7	30	10 <	700	30
Jun 12	318.0 (I)			1	8	10 <	10 <	400	10 <
Jun 27	203.0 (I)			1 <	5	10 <	10 <	100	10 <
N=	15	0	0	15	15	15	15	15	15
Max	321.0			6	8	50	10 <	700	50
Min	0.1			1 <	2	10 <	10 <	100 <	10 <
Mean	109.4			2	5	19	10 <	113	19

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 28.6 Rock Creek at HW 200 crossing near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	18.0			2	7	10	10 <	200	10
AUG	1	14.1			3	4	10 <	10 <	100 <	10 <
SEP	1	4.0			2	6	10 <	10 <	100 <	10 <
OCT	1	0.7			3	7	50	10 <	100 <	50
NOV	1	166.0			2	4	20	10 <	100 <	20
DEC	1	50.0			2	5	30	10 <	100 <	30
JAN	1	50.0			1	3	30	10 <	100 <	30
FEB	1	28.1			2	3	40	10 <	100 <	40
MAR	1	31.8			1	2	10	10 <	100 <	10
APR	2	199.0			1	6	35	10 <	100 <	35
MAY	2	271.0			4	7	15	10 <	500	15
JUN	2	260.5			1 <	7	10 <	10 <	250	10 <
N=	15	12	0	0	12	12	12	12	12	12
Max		271.0			4	7	50	10 <	500	50
Min		0.7			1 <	2	10 <	10 <	100 <	10 <
Mean		91.1			2	5	20	10 <	100 <	20
Annual Nutrient Load (tons/year)					0.16	0.49	1.55	0.00	16.89	1.55

Frequency of Exceedence
Phosphorus Criterion 0%
Nitrogen Criterion 0%

Magnitude of Exceedence
Phosphorus Criterion 0.1 X
Nitrogen Criterion 0.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE
PHOSPHORUS 0.00
NITROGEN 0.00

CUMULATIVE SCORE 0.00

Frequency of Exceedence
Chronic Ammonia Criterion ERR
Acute Ammonia Criterion ERR

Magnitude of Exceedence
Chronic Ammonia Criterion ERR X
Acute Ammonia Criterion ERR X

AMMONIA TOXICITY SEVERITY SCORE
CHRONIC ERR
ACUTE ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN
Monitoring Station:29.5 Bull River at USGS station near mouth
Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 19	358.0 (I)			1 <	5	10	10 <	100 <	10
Aug 08	198.0 (I)			1	4	20	10 <	100 <	20
Sep 11	107.0 (I)			1 <	4	20	10 <	100 <	20
Oct 17	114.0 (I)			1	3	30	10 <	100 <	30
Nov 14	597.0 (I)			2	9	80	10 <	100	80
Dec 20	351.0 (I)			2	5	70	10 <	100	70
Jan 17	358.0 (I)			1	5	50	10 <	100 <	50
Feb 13	471.0 (I)			1	5	50	10 <	100 <	50
Mar 14	388.0 (I)			7	5	30	10 <	100	30
Apr 11	820.0 (I)			2	38	50	10 <	100 <	50
Apr 25	1140.0 (I)			1 <	12	100	10 <	200	100
May 16	1300.0 (I)			2	7	10	10 <	100	10
May 29	1070.0 (I)			1 <	9	70	10 <	700	70
Jun 12	1430.0 (I)			1	12	10 <	10 <	100	10 <
Jun 27	814.0 (I)			1 <	6	20	10 <	100	20
N=	15	0	0	15	15	15	15	15	15
Max	1430.0			7	38	100	10 <	700	100
Min	107.0			1 <	3	10 <	10 <	100 <	10 <
Mean	634.4			1	9	41	10 <	100	41

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 29.5 Bull River at USGS station near mouth

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	358.0			1 <	5	10	10 <	100 <	10
AUG	1	198.0			1	4	20	10 <	100 <	20
SEP	1	107.0			1 <	4	20	10 <	100 <	20
OCT	1	114.0			1	3	30	10 <	100 <	30
NOV	1	597.0			2	9	80	10 <	100	80
DEC	1	351.0			2	5	70	10 <	100	70
JAN	1	358.0			1	5	50	10 <	100 <	50
FEB	1	471.0			1	5	50	10 <	100 <	50
MAR	1	388.0			7	5	30	10 <	100	30
APR	2	980.0			1	25	75	10 <	100	75
MAY	2	1185.0			1	8	40	10 <	400	40
JUN	2	1122.0			1 <	9	10	10 <	100	10
N=	15	12	0	0	12	12	12	12	12	12
Max		1185.0			7	25	80	10 <	400	80
Min		107.0			1 <	3	10	10 <	100 <	10
Mean		519.1			1	7	40	10 <	100 <	40
Annual Nutrient Load (tons/year)					0.65	4.94	22.06	0.00	67.60	22.06

Frequency of Exceedence	
Phosphorus Criterion	0%
Nitrogen Criterion	0%
Magnitude of Exceedence	
Phosphorus Criterion	0.1 X
Nitrogen Criterion	0.0 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	0.00
NITROGEN	0.00
CUMULATIVE SCORE	0.00

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR
Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

APPENDIX C

STATE FISCAL YEAR 1991

CLARK FORK BASIN NUTRIENT MONITORING DATA

WASTEWATER DISCHARGE MONITORING STATIONS

Monitoring Station:00.5 Butte Metro WWTP discharge

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	8.9 (I)	16.7	7.61	2580	2520	180	8390	12100	8570
Aug 06	8.5 (I)	17.8	7.50	1960	2120	470	6820	9100	7290
Sep 11	8.9 (I)	16.0	7.25	2340	2560	2810	1880	3800	4690
Oct 16	8.7 (I)	13.3	7.72	2060	2150	2610	3970	6300	6580
Nov 14	7.4 (I)	12.8	7.63	1950	1920	2810	2580	6600	5390
Dec 19	8.7 (I)	0.0	7.51	2260	1920	2280	5780	7300	8060
Jan 15	7.6 (I)	8.6	7.21	1830	2060	580	8230	10000	8810
Feb 12	7.4 (I)	8.3	7.17	1640	2190	300	8490	8600	8790
Mar 13	8.0 (I)	7.6	7.72	1530	1980	290	9260	11700	9550
Apr 08	7.2 (I)	7.7	7.60	1800	2430	290	9420	11400	9710
Apr 23	7.6 (I)	8.9	7.40	1870	2230	160	9380	11000	9540
May 14	8.9 (I)	10.4	7.64	1940	2270	80	8840	11200	8920
May 29	8.5 (I)	11.3	7.36	2340	2560	260	10600	14100	10860
Jun 11	8.0 (I)	12.4	7.44	2220	2200	100	8180	9600	8280
Jun 24	7.6 (I)	12.7	7.43	1610	1710	310	8100	8000	8410
N=	15	15	15	15	15	15	15	15	15
Max	8.9	17.8	7.72	2580	2560	2810	10600	14100	10860
Min	7.2	0.0	7.17	1530	1710	80	1880	3800	4690
Mean	8.1	11.0	7.48	1995	2188	902	7328	9387	8230

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 00.5 Butte Metro WWTP discharge

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	7.2	16.7	7.61	2580	2520	180	8390	12100	8570
AUG	1	7.5	17.8	7.50	1960	2120	470	6820	9100	7290
SEP	1	7.0	16.0	7.25	2340	2560	2810	1880	3800	4690
OCT	1	6.4	13.3	7.72	2060	2150	2610	3970	6300	6580
NOV	1	6.2	12.8	7.63	1950	1920	2810	2580	6600	5390
DEC	1	6.4	0.0	7.51	2260	1920	2280	5780	7300	8060
JAN	1	6.0	8.6	7.21	1830	2060	580	8230	10000	8810
FEB	1	6.1	8.3	7.17	1640	2190	300	8490	8600	8790
MAR	1	6.5	7.6	7.72	1530	1980	290	9260	11700	9550
APR	2	6.7	8.3	7.50	1835	2330	225	9400	11200	9625
MAY	2	6.8	10.9	7.50	2140	2415	170	9720	12650	9890
JUN	2	7.1	12.6	7.44	1915	1955	205	8140	8800	8345
N=	15	12	12	12	12	12	12	12	12	12
Max		7.5	17.8	7.72	2580	2560	2810	9720	12650	9890
Min		6.0	0.0	7.17	1530	1920	170	1880	3800	4690
Mean		6.7	11.1	7.48	2003	2177	1078	6888	9013	7966
Annual Nutrient Load (tons/year)					13.20	14.29	6.92	45.22	59.33	52.14

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	100%

Magnitude of Exceedence	
Phosphorus Criterion	43.5 X
Nitrogen Criterion	8.0 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	43.53
NITROGEN	7.97

CUMULATIVE SCORE	51.50

Frequency of Exceedence	
Chronic Ammonia Criterion	100%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	3.9 X
Acute Ammonia Criterion	0.5 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	3.87
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:09.5 Deer Lodge lagoons discharge

Instantaneous Values

Date	Streamflow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	3.4 (I)			729	806	70	1340	2500	1410
Aug 07	3.0 (I)			1290	1280	30	3260	4900	3290
Sep 12	1.9 (I)			1610	1660	30	5680	8000	5710
Oct 17	1.1 (I)			1760	1790	110	7060	9800	7170
Nov 15	1.2 (I)			1680	1870	300	6280	7400	6580
Dec 20	1.6 (I)			2380	2440	10	8680	12100	8690
Jan 16	1.4 (I)			2060	2120	20	8920	11700	8940
Feb 13	1.6 (I)			1540	1900	10 <	7230	8300	7230
Mar 14	1.5 (I)			1420	1640	10 <	6600	10800	6600
Apr 09	1.4 (I)			881	1440	200	3440	10100	3640
Apr 24	1.6 (I)			935	1480	430	3130	7400	3560
May 15	1.6 (I)			1180	1360	500	2740	7100	3240
May 30	3.6 (I)			1050	1630	60	4740	8800	4800
Jun 12	5.1 (I)			934	1120	110	3580	5800	3690
Jun 25	5.1 (I)			987	1110	10 <	4040	6000	4040
N=	15	0	0	15	15	15	15	15	15
Max	5.1			2380	2440	500	8920	12100	8940
Min	1.1			729	806	10 <	1340	2500	1410
Mean	2.3			1362	1576	125	5115	8047	5239

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 09.5 Deer Lodge lagoons discharge

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	3.3			729	806	70	1340	2500	1410
AUG	1	2.8			1290	1280	30	3260	4900	3290
SEP	1	1.9			1610	1660	30	5680	8000	5710
OCT	1	1.2			1760	1790	110	7060	9800	7170
NOV	1	1.2			1680	1870	300	6280	7400	6580
DEC	1	1.4			2380	2440	10	8680	12100	8690
JAN	1	1.6			2060	2120	20	8920	11700	8940
FEB	1	1.6			1540	1900	10 <	7230	8300	7230
MAR	1	1.5			1420	1640	10 <	6600	10800	6600
APR	2	1.4			908	1460	315	3285	8750	3600
MAY	2	2.0			1115	1495	280	3740	7950	4020
JUN	2	3.5			961	1115	55	3810	5900	3865
N=	15	12	0	0	12	12	12	12	12	12
Max		3.5			2380	2440	315	8920	12100	8940
Min		1.2			729	806	10 <	1340	2500	1410
Mean		1.9			1454	1631	102	5490	8175	5592
Annual Nutrient Load (tons/year)					2.55	2.85	0.17	9.23	13.99	9.41

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	100%

Magnitude of Exceedence	
Phosphorus Criterion	32.6 X
Nitrogen Criterion	5.6 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	32.63
NITROGEN	5.59

CUMULATIVE SCORE	38.22

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR

Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:17 Missoula WWTP discharge

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	13.2 (I)	17.9	7.60	2540	2490	9350	1460	3400	10810
Aug 05	12.1 (I)	18.5	7.70	2410	2440	3900	2300	9200	6200
Sep 10	13.2 (I)	19.1	7.32	2680	2610	6700	1850	4100	8550
Oct 15	12.1 (I)	16.3	7.56	2820	2830	5780	12600	15900	18380
Nov 12	13.5 (I)	14.8	7.57	3100	2970	2150	11500	13000	13650
Dec 18	11.7 (I)	12.5	7.75	3820	3680	40	19600	22700	19640
Jan 15	11.6 (I)	12.7	7.76	3140	3090	600	19000	21300	19600
Feb 11	11.8 (I)	11.6	7.84	2560	2640	130	14100	15800	14230
Mar 12	11.8 (I)	10.8	7.73	2720	2590	160	17400	18500	17560
Apr 09	11.0 (I)	12.2	7.71	2930	2880	160	21100	26600	21260
Apr 24	12.4 (I)	11.2	7.63	3220	3260	200	24500	24000	24700
May 14	12.9 (I)	11.5	7.98	2990	2950	570	19600	19400	20170
May 28	13.5 (I)	11.3	7.31	2350	2370	4520	5970	8300	10490
Jun 11	13.6 (I)	15.0	7.33	2620	2490	4170	6180	7500	10350
Jun 25	11.9 (I)	15.2	7.38	2740	2810	6500	13900	13900	20400
N=	15	15	15	15	15	15	15	15	15
Max	13.6	19.1	7.98	3820	3680	9350	24500	26600	24700
Min	11.0	10.8	7.31	2350	2370	40	1460	3400	6200
Mean	12.4	14.0	7.61	2843	2807	2995	12737	14907	15733

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 17 Missoula WWTP discharge

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	10.7	17.9	7.60	2540	2490	9350	1460	3400	10810
AUG	1	10.2	18.5	7.70	2410	2440	3900	2300	9200	6200
SEP	1	10.3	19.1	7.32	2680	2610	6700	1850	4100	8550
OCT	1	10.2	16.3	7.56	2820	2830	5780	12600	15900	18380
NOV	1	10.4	14.8	7.57	3100	2970	2150	11500	13000	13650
DEC	1	9.4	12.5	7.75	3820	3680	40	19600	22700	19640
JAN	1	9.1	12.7	7.76	3140	3090	600	19000	21300	19600
FEB	1	9.8	11.6	7.84	2560	2640	130	14100	15800	14230
MAR	1	9.1	10.8	7.73	2720	2590	160	17400	18500	17560
APR	2	10.0	11.7	7.67	3075	3070	180	22800	25300	22980
MAY	2	11.2	11.4	7.65	2670	2660	2545	12785	13850	15330
JUN	2	10.1	15.1	7.36	2680	2650	5335	10040	10700	15375
N=	15	12	12	12	12	12	12	12	12	12
Max		11.2	19.1	7.84	3820	3680	9350	22800	25300	22980
Min		9.1	10.8	7.32	2410	2440	40	1460	3400	6200
Mean		10.0	14.4	7.63	2851	2810	3073	12120	14479	15192
Annual Nutrient Load (tons/year)					28.04	27.64	31.54	117.09	140.45	148.62

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	100%

Magnitude of Exceedence	
Phosphorus Criterion	56.2 X
Nitrogen Criterion	15.2 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	56.20
NITROGEN	15.19

CUMULATIVE SCORE	71.39

Frequency of Exceedence	
Chronic Ammonia Criterion	100%
Acute Ammonia Criterion	63%

Magnitude of Exceedence	
Chronic Ammonia Criterion	7.2 X
Acute Ammonia Criterion	1.3 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	7.17
ACUTE	0.79

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

CLARK FORK BASIN MONITORING - FY 1991 MONTANA WATER QUALITY BUREAU GARY INGMAN

Monitoring Station:21 Stone Container Corporation wastewater discharge

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 17	0.0 (I)								
Aug 06	0.0 (I)								
Sep 10	0.0 (I)								
Oct 15	13.4 (I)	8.7	8.24	845	973	90	1960	4400	2050
Nov 12	14.5 (I)	7.8	8.41	997	1060	120	1880	3900	2000
Dec 18	0.0 (I)								
Jan 15	6.1 (M)	2.6	8.04	706	1020	50	2050	5400	2100
Feb 11	2.6 (M)	3.5	8.01	727	1010	410	1940	5800	2350
Mar 12	2.7 (I)	1.8	7.72	372	711	360	1170	6400	1530
Apr 10	23.7 (I)	7.2	8.03	61	376	60	440	3500	500
Apr 24	16.0 (I)	10.5	7.91	73	424	980	520	3500	1500
May 14	41.2 (I)	11.5	8.26	250	567	40	1670	4700	1710
May 28	25.5 (I)	13.2	8.31	462	740	20	2850	5800	2870
Jun 11	39.6 (M)	19.6	7.85	305	595	10 <	2380	5400	2380
Jun 26	30.6 (I)	13.7	7.99	134	445	10 <	1500	4400	1500
N=	15	11	11	11	11	11	11	11	11
Max	41.2	19.6	8.41	997	1060	980	2850	6400	2870
Min	0.0	1.8	7.72	61	376	10 <	440	3500	500
Mean	14.4	9.1	8.07	448	720	194	1669	4836	1863

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 21 Stone Container Corporation wastewater discharge

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	0	13.5								
AUG	0	0.0								
SEP	0	0.6								
OCT	1	10.2	8.7	8.24	845	973	90	1960	4400	2050
NOV	1	9.6	7.8	8.41	997	1060	120	1880	3900	2000
DEC	0	3.4								
JAN	1	1.9	2.6	8.04	706	1020	50	2050	5400	2100
FEB	1	2.9	3.5	8.01	727	1010	410	1940	5800	2350
MAR	1	4.8	1.8	7.72	372	711	360	1170	6400	1530
APR	2	17.2	8.9	7.97	67	400	520	480	3500	1000
MAY	2	55.9	12.4	8.29	356	654	30	2260	5250	2290
JUN	2	46.5	16.7	7.92	220	520	10 <	1940	4900	1940
N=	11	12	8	8	8	8	8	8	8	8
Max		55.9	16.7	8.41	997	1060	520	2260	6400	2350
Min		0.0	1.8	7.72	67	400	10 <	480	3500	1000
Mean		13.9	7.8	8.07	536	793	198	1710	4944	1908
Annual Nutrient Load (tons/year)					4.49	7.88	1.28	22.86	59.26	24.13

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	94%

Magnitude of Exceedence	
Phosphorus Criterion	15.9 X
Nitrogen Criterion	1.9 X

NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	15.87
NITROGEN	1.79

CUMULATIVE SCORE	17.66

Frequency of Exceedence	
Chronic Ammonia Criterion	75%
Acute Ammonia Criterion	0%

Magnitude of Exceedence	
Chronic Ammonia Criterion	2.1 X
Acute Ammonia Criterion	0.4 X

AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	1.61
ACUTE	0.00

NOTE:Monthly average streamflows are USGS monthly means where available.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Ammonia toxicity evaluations valid for temperatures between -1 and 30 degrees Centigrade and pH's between 6.5 and 9.0 only. Values outside of these ranges will result in errors.

Monitoring Station:24.5 Superior sewage lagoon discharge

Instantaneous Values

Date	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
Jul 18	0.1 (I)			4320	4780	460	14500	20100	14960
Aug 06	0.1 (I)			3530	4280	1100	11500	19200	12600
Sep 10	0.1 (I)			3520	3700	850	12000	16000	12850
Oct 16	0.1 (I)			3410	3530	80	11400	15200	11480
Nov 13	0.1 (I)			3410	3450	70	15700	19000	15770
Dec 19	0.1 (I)			3320	3160	90	17700	19400	17790
Jan 16	0.2 (I)			3220	3640	30	18500	20400	18530
Feb 12	0.2 (I)			2770	3420	40	18700	22900	18740
Mar 13	0.1 (I)			3060	3300	110	14500	25600	14610
Apr 10	0.1 (I)			2630	3630	110	14300	22300	14410
Apr 24	0.1 (I)			2830	3620	210	13700	16100	13910
May 15	0.1 (I)			3310	3160	280	15700	22000	15980
May 29	0.1 (I)			1780	3470	900	8810	24100	9710
Jun 12	0.1 (I)			2220	3530	2160	5680	12500	7840
Jun 26	0.1 (I)			3800	3640	250	12800	15300	13050
N=	15	0	0	15	15	15	15	15	15
Max	0.2			4320	4780	2160	18700	25600	18740
Min	0.1			1780	3160	30	5680	12500	7840
Mean	0.1			3142	3621	449	13699	19340	14149

NOTE:Estimated streamflows are denoted with an (E) following the value.
Instantaneous streamflows (gaged) are denoted with an (I) following the value.
Mean daily streamflows (USGS) are denoted with an (M) following the value.

Nutrient values less than the analytical detection limit are denoted with a less than sign (<) following the result and are considered to be zero in the data computations.

Station: 24.5 Superior sewage lagoon discharge

Monthly Average Values

Month	N=	Stream-flow (cfs)	Water Temp. (deg.C)	pH	Diss.Ortho P (SRP) Conc. (ug/l as P)	Total P Conc. (ug/l as P)	Diss.NO3+NO2 Conc. (ug/l as N)	Diss.NH3+NH4 Conc. (ug/l as N)	Total KJL-N Conc. (ug/l as N)	TSIN Conc. (ug/l as N)
JUL	1	0.1			4320	4780	460	14500	20100	14960
AUG	1	0.1			3530	4280	1100	11500	19200	12600
SEP	1	0.1			3520	3700	850	12000	16000	12850
OCT	1	0.1			3410	3530	80	11400	15200	11480
NOV	1	0.1			3410	3450	70	15700	19000	15770
DEC	1	0.1			3320	3160	90	17700	19400	17790
JAN	1	0.2			3220	3640	30	18500	20400	18530
FEB	1	0.2			2770	3420	40	18700	22900	18740
MAR	1	0.1			3060	3300	110	14500	25600	14610
APR	2	0.1			2730	3625	160	14000	19200	14160
MAY	2	0.1			2545	3315	590	12255	23050	12845
JUN	2	0.1			3010	3585	1205	9240	13900	10445
N=	15	12	0	0	12	12	12	12	12	12
Max		0.2			4320	4780	1205	18700	25600	18740
Min		0.1			2545	3160	30	9240	13900	10445
Mean		0.1			3237	3649	399	14166	19496	14565
Annual Nutrient Load (tons/year)					0.42	0.48	0.05	1.89	2.57	1.94

Frequency of Exceedence	
Phosphorus Criterion	100%
Nitrogen Criterion	100%
Magnitude of Exceedence	
Phosphorus Criterion	73.0 X
Nitrogen Criterion	14.6 X
NUTRIENT ENRICHMENT SEVERITY SCORE	
PHOSPHORUS	72.98
NITROGEN	14.57
CUMULATIVE SCORE	87.54

Frequency of Exceedence	
Chronic Ammonia Criterion	ERR
Acute Ammonia Criterion	ERR
Magnitude of Exceedence	
Chronic Ammonia Criterion	ERR X
Acute Ammonia Criterion	ERR X
AMMONIA TOXICITY SEVERITY SCORE	
CHRONIC	ERR
ACUTE	ERR

NOTE:Monthly average streamflows are USGS monthly means where available.

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